BUREAU OF HYGIENE AND TROPICAL DISEASES.

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MALARIA.

STRICKLAND (C.). **The Foundations of Antimalarial Work.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Nov. 28. Vol. 30. No. 3. pp. 369–378. With 5 text figs. & 5 figs. on 2 plates.

This is an interesting discussion of the processes of erosion or degradation and accretion that are continually taking place wherever water flows over the land. The complications inseparable from the study of these phenomena are lucidly described. The subject is of more theoretical than practical importance. "It is unfortunate then that while water action is the most important agent in the creation of the face of the land, the points of evidence that would seem to be available for indicating the antithetic tracts of accretion and degradation, the delta and the paradelta, are, except at the poles of the hydrographic system, equivocal." *Norman White.*

WILLIAMSON (K. B.). **The Soil in Relation to Malaria.**—7 pp. [23 refs.] 1936. League of Nations, Eastern Bureau, Singapore.

An interesting and suggestive dissertation the scope of which is indicated by the following extracts :—

" . . . the relation of soil to malaria is the biggest outstanding ecological problem with which malariology is faced. Its practical significance is increased by the probability . . . that the power of potential vectors to transmit malaria may be abolished by an accumulation of organic nitrogen in the soil through agricultural or other agency which is less than is needed to abolish the mosquitoes concerned, and is therefore easier and cheaper to produce. The probable direct effect upon both the incidence (specific anopheline potential) and the vectorial potency (infective potential) of vectors, of the enrichment of the soil accompanying 'bonification' has curiously escaped general recognition.

" . . . The possibility of yet unrecognized races of individual anopheline species found in the tropics, analogous to those of *A. maculipennis* in Europe, which may prove to differ among themselves both in ecological adaptation and in vectorial power, poses the question whether the latter is primarily determined by environmental or by fixed hereditary factors (genes). These two phenomena are unlikely to be independent of one another ; and the present writer has put forward the view that the character of the food, both larval and adult, to which a species or race has been habituated for long periods, must influence its physiological constitution and vectorial power : and further that general purity of larval food " . . . has " determined their ability to serve as intermediate hosts of blood parasites . . . . Upon this view, other things being the same, anopheline

mosquitoes should be best adapted for transmitting malaria when their larval food and general environment, as well as the drinking water of the adults, are least contaminated with bacteria, especially putrefactive bacteria and their products, which are absent from blood." *N. W.*

PAMPANA (E. J.). **Anophelism without Malaria.**—*Malayan Med. Jl.* 1936. Dec. Vol. 11. No. 4. pp. 214–222. With 1 fig.

This is a lecture delivered before the International Course of Malariology at Singapore. It is an extremely interesting historical account of researches that have, during recent years, thrown a good deal of light on certain aspects of the problems presented by anophelism without malaria. For the most part the lecture is concerned with the work done in Italy and in Holland on the differentiation of the different varieties of *A. maculipennis*. Though the knowledge so gained may not have explained the phenomenon of anophelism without malaria everywhere in Europe it has gone a long way towards doing so.

N. W.

HONG KONG. REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES FOR THE YEAR 1935 [WELLINGTON (A. R.)]. Appendix B. pp. 122–172. With 2 folding maps.—**Annual Report of the Work of the Malaria Bureau for the Year 1935** [JACKSON (R. B.), Malariologist].

Malaria is no longer the important cause of morbidity and death in Hong Kong that it was in the early years of the Colony. In 1935, 400 deaths were ascribed to malaria, a death rate of 0·41 per mille, 1·8 per cent. of the total deaths. Though malaria has practically disappeared from the populous districts of Victoria and Kowloon, it is still prevalent on the outskirts of the City, in the rural areas of the Island and on the mainland and necessitates vigilance. The Malaria Bureau has therefore a useful function to fulfil and the report under review shows that full advantage was taken of the opportunities offered. Investigations concerning the local anophelines were continued with special reference to their relative importance as vectors of infection.

Anophelines breeding in hilly country are responsible for nearly all the indigenous malaria. Of the 43,087 larvae identified 15,901 were *hyrcanus* var. *sinensis*, 15,095 *maculatus*, 5,621 *minimus*, 5,227 *jeyporiensis*, 549 *aitkenii* var. *bengaliensis*, 420 *karwari*, 182 *splendidus*, and 92 *vagus*. Adults of *tesselatus* were found but no larvae. In morning catches of adults in human habitations *minimus* and *jeyporiensis* var. *candidiensis* were predominant; *maculatus* which was prevalent in cow byres and pigsties was but rarely caught in human habitations. The two chief vectors of malaria in Hong Kong appear to be *minimus* and *jeyporiensis*: *maculatus*, though a carrier, is of secondary importance; it is markedly zoophilic. Infected specimens of *hyrcanus* and *tesselatus* were also found.

Attention was also given to the local culicines and some interesting observations were made regarding the presence of larval filariae in them and in certain of the anophelines.

An account is given of investigations into the prevalence of malaria in certain areas and of the action taken to diminish the local prevalence of mosquitoes in parts of the territory. The training of inspectors and co-operation with other departments, both military and civil, were not the least important parts of the Bureau's activities in 1935. *N. W.*

ZIEMANN (Hans). Ueber Kriegsmalaria und Kriegsmalariafolgen [**War Malaria and its Results.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 73–90. [47 refs.]

According to a famous saying, war is the father of everything, including malaria. During the world war on the German side 120,781 persons were treated in hospital for malaria, giving a percentage of 19·8 per mille, of these 81·9 per mille were returned to duty fit for service, and only 0·37 per mille died. 1·2 per mille were discharged as unfit for service. In the Chaco war nearly every soldier of the first army corps of the Paraguayan troops suffered from malaria, whilst in the second army corps 60 per cent. were attacked, mostly benign tertian infections. In the recent Abyssinian-Italian war there was little malaria amongst the Italian troops according to Professor Ilvento. The most important points concern :—the diagnosis, malarial parasites in war conditions, the biology of anophelines, as well as the pathology of the disease and the results of mixed infections with other diseases, *e.g.* tuberculosis. As regards therapy under war conditions, for prophylaxis atebrin is recommended, either 0·05 gm. daily or 0·2 gm. twice weekly. For permanently clearing a malarial area 0·02 gm. plasmoquine twice weekly is recommended with a view to preventing the development of gametes in anophelines. In the war blackwater fever played an important part on account of the liberal use of quinine. Of deaths from all causes amongst the German troops in East Africa, 62·4 per cent. were due to blackwater fever. Amongst the British troops there was a fatality rate of 25–30 per cent. from blackwater fever. The author considers that if malaria is dealt with on the lines laid down by him, future wars will lose many of their terrors.

E. D. W. Greig.

MÜHLENS (P.). Ueber Kriegsmalaria. [**War Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 90–105. [18 refs.]

According to the literature and the author's experience, the possibility of a long latent period and parasitic relapses after ten years must be admitted in the case of the quartan infection. Therefore it is our duty in suspected cases of infection contracted in the world war to investigate very thoroughly such quartan infections, although the author has not met with a single case in the course of his work in the Hamburg Tropical Institute. As regards malignant tertian infections, in the course of his 35 years' experience he has not met with a single case 5 years after the primary infection, which had not been exposed to fresh infection in the interval. The same applies to benign tertian infections, although very rarely there may be a prolonged latent period of 1–3 years. He quotes BROUGHTON-ALCOCK, who, as a result of the examination of 50,000 persons who had taken part in the world war, stated that, "I can with certainty assert that malarial parasites in cases of war malaria do not remain in the blood more than 5 years after return home." In regard to damage to organs following an old malarial infection, to establish this it is essential that the presence of a malarial infection should be proved by blood examination. As regards nephritis attributed to old malarial infection, quartan malaria may produce this not infrequently, but the author has not seen amongst the cases of nephritis which he has observed 10–20 years after the war

any which could be proved to be due to malaria. As regards cirrhosis of the liver attributed to malaria contracted during the war, he considers that the first appearance of liver symptoms so long (18 years) after the infection is against rather than in favour of a connexion with malaria. *E. D. W. Greig.*

FISCHER (O.). Kriegsmalaria und ihre Folgen. [**War Malaria and its Results.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 105–113. With 9 figs.

The author records his observations on war malaria as seen in cases which came under his observation in the convalescent home for tropical diseases in Tübingen. Six hundred and eleven cases were treated and investigated. In only one of these cases, in 1921, could malaria parasites be demonstrated in the blood, and, on two occasions, in 1922 and 1923, a diagnosis of malaria was arrived at from the clinical symptoms alone (splenomegaly and monocytosis) ; no parasites were found in the blood. All the others were not malaria ; various provocative methods were employed with a view to activating a possible latent infection. Blood preparations which were said to contain malaria parasites, sent with the cases, showed that blood platelets and particularly deposits of stain had been mistaken for parasites, hence the errors in diagnosis. Such conditions as tonsillitis, sinusitis, bronchiectasis, tuberculosis, cystitis (*Bact. coli*), cholecystitis, hepatitis, syphilis, appendicitis, subphrenic abscess, furunculosis, osteomyelitis, haemorrhoids, endocarditis were mistaken for post-war malaria. The author thinks that these do not exhaust the list of diseases which may have been confused with malaria. *E. D. W. Greig.*

BENTMANN (E.). Der heutige Stand der Kriegsmalaria im Bereich des Haupt-Versorgungsamts Südwestdeutschland im Vergleich zu dem Stande im Jahre 1929. [**Present Position of War Malaria compared with that of 1929.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 113–117.

The information was collected by the chief office of the administration of South-West Germany. As a result of his investigation the author was able to lay down the following rules :—It is imperative that medical officers, who have occasion to treat persons who have taken part in the war and have had malaria during the war and are said to be still suffering from it, should only diagnose malarial infection if (*a*) they have observed one or more febrile attacks, (*b*) blood has been taken during the pyrexia and sent to a recognized institute and a positive result obtained, and (*c*) the likelihood of other causes of fever has been excluded by thorough clinical investigation.

E. D. W. Greig.

PELTIN (Ch.). Anchetă paludică într'o comună rurală (Năsturelu, judeţul Teleorman). [**Malaria Investigation in a Rural Commune, Năsturelu, Teleorman Department, Rumania.**]—*Rev. Igienă Socială.* Bucharest. 1936. Nov.–Dec. Vol. 6. Nos. 11–12. pp. 643–650.

The village of Năsturelu lies to the north of the inundated area of the Danube, and has many collections of stagnant water. Inhabitants

number 1,038, and their chief occupation is fishing. Among them in one year 232 cases of malaria occurred, 22·3 per cent. Nine-tenths of the population were examined and the splenic index among the children [up to what age this includes is not stated, but cases are divided into those under 10 years and others, so presumably this means those of 10 years or less] was 45·6 per cent., among adolescents and adults 15 per cent. Measures taken to deal with the disease are: Increase in the sanitary personnel, compulsory treatment, preventive quininization, antilarval measures and propaganda. *H. H. S.*

EJERCITO (Antonio). **Present Orientation in the Control of Malaria in Tropical Countries.**—*Monthly Bull. Bureau of Health.* Manila. 1936. Mar. Vol. 16. No. 3. pp. 77–87.

This paper is of little more than local interest. By far the most important vector of malaria in the Philippines is *A. minimus* var. *flavirostris*. The author advocates "biological or naturalistic methods to control malaria in the Philippines." He has been successful in effecting a marked reduction in the breeding of *A. minimus* by the conversion of a stream into a series of pools and small spillway waterfalls by a series of dams; *minimus* does not breed in stagnant water. Flushing has given good results, as has the removal of all obstacles to direct sunlight reaching the breeding place. Reference is made to anti-malaria work in Malaya and in Java, which countries have recently been visited by the author. *N. W.*

BLACKLOCK (D. B.). **Studies in Rural Hygiene in the Tropics. III. Simple Forms of Subsurface Drainage for Anti-Malaria Work.** —*Ann. Trop. Med. & Parasit.* 1936. Dec. 23. Vol. 30. No. 4. pp. 501–510. With 6 figs. on 2 plates.

This is an account of various forms of cheap subsurface drainage now being tried out in India and Malaya, which may be applicable to rural areas in which the usual methods of subsoil drainage are prohibitively costly. Stone drains have been used with success: their construction is cheap if there is a sufficiency of stone within easy reach. Bamboo has been used as a substitute for subsoil drainage pipes. Good results can be obtained by using short lengths obtained by cutting the bamboo close to either side of the septum. The durability of bamboo varies as does the size of the lumen in relation to the outside circumference; these are points that repay study. Percolation pits constructed in stream beds have given good results in tea estates in the north of India. Stick and fascine drains are also described (see this *Bulletin*, 1937, Vol. 34, p. 212). *N. W.*

BARROWMAN (Barclay). **Notes on a Demonstration of Malaria Control.** —*Malayan Med. Jl.* 1936. Mar., June & Sept. Vol. 11. Nos. 1, 2 & 3. pp. 6–27; 91–104; 161–177. With 62 figs., 3 maps & 10 charts.

These notes were written for the benefit of students of the League of Nations Malaria Course at Singapore who were privileged to attend the author's demonstration of malaria control in Selangor. It is well that they should have been made available to a wider circle of malaria workers by publication in a medical journal. The author succeeded

Malcolm WATSON whose work in Selangor is known to all. His story of the conquest of those three virulent carriers of malaria, *A. umbrosus*, *A. sundaicus*, and *A. maculatus*, is likewise familiar, but it is a story that is well worth retelling, and in Parts I and II of this paper the story is well retold and brought up to date.

Part III is concerned with the clinical aspect of malaria control. All cases of malaria on plantations are admitted to hospital: they are given thirty grains of quinine bihydrochloride a day for two days, then four tablets of atebrin a day for four days. The relapse rate with this treatment has been only nine per cent. In one isolated estate where there is no mosquito control, in which *A. umbrosus* is the vector and which was one hundred per cent. malarious, remarkable results were obtained with plasmoquine. Quinine bihydrochloride, seven and a half grains, with 0·005 gm. of plasmoquine was given twice daily for 14 days in each three months. For twenty months thereafter no clinical case of malaria occurred.

The paper ends with a summary of the results achieved by the various methods employed and an interesting discussion of the cost of malaria control on the group of estates concerned. The author's experience of the control of malaria fully justifies his claim that "practical elimination is not too high a standard at which to aim." *N. W.*

CRAIG (W. J. F.). Anti-Malaria Drainage Work in the New Changi Cantonment.—*Jl. Roy. Army Med. Corps.* 1937. Jan. & Feb. Vol. 68. Nos. 1 & 2. pp. 15–26; 73–85. With 9 figs.

GRUNSKE (F.). Ergebnisse und Erfahrungen der Malaria-Untersuchungsstation in Emden (Ostfriesland) von 1910–1933. [**Results of Experiences at the Malaria Investigation Station at Emden from 1910 to 1933.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 117–124. With 5 figs.

In all 74,199 investigations were made and only 15,865 gave positive results. The population of the town and country in general was not equally attacked by the endemic disease neither in regard to place nor season. It was characterized by localized occurrence in certain areas; after a long time the malaria died out in these areas and flared up in other districts, but it appeared after a shorter or longer interval in the old malarial foci again. Under favourable temperature conditions, over 16°C., malaria may take on an epidemic character, appearing simultaneously in many districts, but this only occurs when there are numerous parasite carriers and chronic cases in the stricken villages. A noteworthy feature is that during the past 25 years the endemic foci of malaria have shown no inclination to extend to the rest of North-West Germany, even under the favourable conditions of 1917. During the world war there was an enormous increase in the number of cases, the peak being reached in 1918, in 1919 there was a rapid fall in the number of cases, the lowest point was reached in 1929. *E. D. W. Greig.*

RUSSELL (Paul F.). **Malaria in India. Impressions from a Tour.**—*Amer. Jl. Trop. Med.* 1936. Nov. Vol. 16. No. 6. pp. 653–664.

The impressions of an expert observer, culled during a visit to a country unknown to him, generally make interesting reading. Dr. Russell's impressions, read to the American Society of Tropical

Medicine, are no exception. The complexity and magnitude of the malaria problem of British India were thoroughly appreciated. The many-sided nature of the problem is illustrated by brief descriptions of malaria conditions in Bombay City, Bengal Presidency, and Assam.

The author realises that in the rural parts of India, in which 90 per cent. of the population live, it is not feasible at present, for economic reasons, to control malaria by any known method. Many will also agree with him that in places where adequate control is feasible—cities, towns, pilgrim centres, industrial enterprises and the like—more might have been done than has been accomplished. Appreciative reference is made to the importance of India's contribution to malariology. *N. W.*

SIMITCH (Tcheda). Etudes sur la malaria dans la Serbie du Sud, Banovine du Vardar. [**Malaria in the Vardar Province, Southern Serbia.**]—*Bull. Office Internat. d'Hyg. Publique.* 1936. Sept. Vol. 28. No. 9. pp. 1690–1734. With 1 chart & 1 map.

This report by the Director of the Skoplie Institute of Hygiene deals with the prevalence of malaria in the southern part of Serbia. It is based on the cases of malaria that have been observed in Skoplie during nine years, 1927–1935. Avoidance of repetition and considerable condensation would have added to the interest of the report and made it more readable.

The geographical features of the district and its climate are adequately described. Five anophelines are found, *maculipennis, superpictus, bifurcatus, sinensis* and *nigripes* : the three last-named play no rôle of importance in the local transmission of malaria. *A. maculipennis* prevails throughout the province ; *superpictus* is confined to those portions of the southern part of the area where flowing water is available for its breeding. In certain areas rice fields are of importance in the propagation of *maculipennis*. *A. maculipennis* var. *messeae* and *maculipennis* var. *maculipennis* are both found in varying proportions from place to place, season to season, and year to year.

P. vivax, falciparum and *malariae* all occur : quartan fever is rare. *P. falciparum* becomes increasingly prevalent the further one travels south : in the north of the province it is relatively rare. As in other Balkan countries the great majority of cases that occur in the first half of the year are *vivax* infections ; there is every year a marked rise in the number of cases in the month of May. In two years out of the nine there were, indeed, more cases of benign tertian fever in May than in any other month of the year. As the period of active transmission only begins in the middle of May the great majority of these cases must be either relapses or primary cases infected the previous year, with prolonged periods of incubation.

Malignant tertian makes its appearance, as elsewhere in the Balkans, in the second half of July. This form of malaria rarely accounts for more than a third of the total cases of malaria in Southern Serbia, though in exceptional years the number of cases may exceed that of benign tertian. *N. W.*

MARGOLIT (D.). **Malaria among the Arabs.**—*Harefuah.* 1936. Dec. Vol. 11. No. 12 (66). [In Hebrew. English summary p. 2.]

This is an attempt to estimate from cases attending his private clinic the relative prevalence of the different malaria infections. Of

1,221 malaria patients seen by the author in the past 3 years children made 60 per cent. ; more than one-fifth, 232 or 21·5 per cent., of the cases occurred in August, which is the month of greatest prevalence, and only a small percentage, 6·2, suffer from *P. falciparum* infection. The Public Health Department wage war against Anopheles and their breeding places, but the Southern Beduins are constantly reintroducing infection at the Sharon and they must be thoroughly treated if the best results are to be attained. *H. H. S.*

MADWAR (S.). **A Preliminary Note on *Anopheles pharoensis* in Relation to Malaria in Egypt.**—*Jl. Egyptian Med. Assoc.* 1936. Oct. Vol. 19. No. 10. pp. 616–617.

During an outbreak of malaria at Gabel El Asfar in July 1936, one hundred and thirty eight *A. pharoensis* were dissected. Oöcysts were found in 19, sporozoites in the salivary glands in two. *N. W.*

MENNONNA (Gerardo). Contributo alla conoscenza della malaria somala risultati degli accertamenti microscopici. [**Prevalence of Malaria in Somalia as seen by Microscopical Examinations.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Nov. Vol. 17. No. 11. pp. 678–683.

It is stated by the author that speaking for Somalia as a whole benign tertian and subtertian infections are about equal, quartan very few, but that a study of local prevalences shows that the relative numbers are very variable. An aggregate of 17 small localities, where only a few examinations were made, gave a total of 525 positive, of which 327 (63·3 per cent.) were *P. vivax*, 187 (35·6) *P. falciparum* and 11 (2·1) *P. malariae.* In Magodiscio the first two were nearly equal : of 486 positive 222 (45·7 per cent.) were *P. vivax* and 243 (50 per cent.) *P. falciparum*, but in Villabbruzzi the subtertian vastly predominated. Of 3,084 positive 2,777, or 90 per cent., were *P. falciparum* infections, 187 (6·1) *P. vivax* and 120 (3·9) *P. malariae.* A mixture of infections, *P. vivax* and *P. falciparum*, was infrequent. *H. H. S.*

ROSE (G.) & WANG (B. L.). Beobachtungen aus 7 Jahren ueber das Vorkommen von Malaria tertiana, Malaria tropica und Malaria quartana in Hangchow und einigen anderen Plätzen Chekiangs. [**Seven Years' Observations on Malaria in Hangchow.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Jan. Vol. 41. No. 1. pp. 130–153. With 7 figs. [10 refs.]

The results were based on 20,480 blood examinations of cases suspected to be infected with malaria. Of these, parasites were found in 4,403 and 16,077 were negative as regards parasites. Of the 4,403 positives the species of parasite could not be precisely determined in 355 thus leaving 4,048 only ; of these, 2,345 were cases of infection with *P. vivax*, 1,161 with *P. falciparum* and 542 with *P. malariae.* The benign tertian malaria case curve in Hangchow shows yearly two peaks, the first in July the second in the autumn months. The malignant tertian malaria curve of cases shows the same double peak ; in 1935 there was an extraordinary rise in the number of cases of malignant tertian infections, the curve was in this year also different in shape, the double peak was absent, there being no remission as usual in August, instead a steady increase took place. As regards quartan infections, they consider that the number is greatly underestimated in

China because the cases seldom come for medical treatment. Four species of anophelines are present in Hangchow, *A. hyrcanus* var. *sinensis*, *A. aitkeni*, *A. lindesayi* and *A. minimus*. In the whole of China 24 species of anophelines are known. All 4 species in Hangchow are important carriers of malaria, according to the sporozoite and oöcyst index. The normal rise of the high summer temperature in Hangchow produces unfavourable conditions for the life of the mosquitoes, the diminution of the relative humidity has the same effect. The abnormal summers of 1934 and 1935 produced alterations in the malaria curves, in the former the temperature was high and moisture low, and the case curve showed a well marked remission in August, but in the latter the summer was cool and the relative humidity high and, as already stated, there was a marked increase of malaria with no remission in August. A series of graphs illustrates the course of the malaria.

E. D. W. Greig.

GASCHEN (H.) & MARNEFFE (H.). Infection naturelle de *A. hyrcanus* var. *sinensis* dans le delta du Fleuve Rouge. [**Natural Infection of *A. sinensis* in the Red River Delta.**]—*Bull. Soc. Path. Exot.* 1936. Nov. 18. Vol. 29. No. 9. pp. 970–975. [24 refs.]

In the deltaic country of Tonking malaria is present but its endemicity is low; from time to time localized epidemic outbreaks occur. Until recently no infected anophelines had been found there: *A. aconitus* was generally suspected to be the chief vector. During a recent epidemic in Binh-Ha in the middle of the delta eight *A. sinensis* out of 163 dissected were found to be infected. Other species captured included *vagus*, *aconitus*, *tesselatus*, *barbirostris*, and *hyrcanus* var. *nigerrimus*; none of these was found infected. This observation is of considerable local importance as *A. sinsensis* is very widespread. Hitherto it has been regarded as a vector of very secondary importance in French Indo-China though infected specimens have been found.

N. W.

GASCHEN (H.). Contribution à l'étude de l'infection naturelle des anophèles au Tonkin. [**Natural Infection of Anophelines in Tonking.**]—*Bull. Soc. Path. Exot.* 1936. Dec. 9. Vol. 29. No. 10. pp. 1093–1095.

An outbreak of malaria in a village in the Delta of the Red River, Tonking, is reported in which *A. hyrcanus* var. *sinensis* was the chief vector. A similar experience in a village 14 kilometres away was recently recorded (see above). Previously this species was regarded as relatively harmless in Indo-China. During the outbreak now recorded one *A. tesselatus* and one *A. hyrcanus* var. *nigerrimus* were found with salivary gland infections. Neither species is sufficiently prevalent to make it at all likely that they will prove to be vectors of importance, but the observation is of interest. *N. W.*

PATIÑO CAMARGO (Luis). Informe acerca de la epidemia de paludismo de Cambao. (Enero de 1936.) [**Outbreak of Malaria in the District of Cambao (Colombia).**]—*Rev. de Higiene.* Bogota. 1936. Jan. & Feb. Vol. 17. No. 1. pp. 5–18.

In the last week of 1935 and the first of 1936 disease broke out in Cambao and assumed an epidemic character. The poorer people

were most attacked, of all ages and either sex. In the middle of the second week when a Commission arrived to investigate, some 70 cases had already occurred and in the first week of January four died. Blood smears were examined for malaria or other parasites, samples of blood were taken for the yellow fever protection test, and haemocultures made. The total population is not stated, but of 54 blood slide specimens examined 19 were positive for malaria, 15 showing *P. vivax*, 3 *P. falciparum*, and one both. Blood cultures all proved sterile. Seventy-seven samples to be tested for yellow fever have not yet been reported upon [at all events no mention is made of the results in this paper]. Anopheles are abundant ; Aëdes were plentiful in the houses and the adjuncts, in 83 per cent. larvae were found and Aëdes predominated. *H. H. S.*

LIMA (J. de Araujo). Constante endemica da região do Gurupy. [**Nosology of Gurupy.**]—*Brasil-Medico.* 1936. May 9. Vol. 50. No. 19. pp. 398–405. With 1 map.

Gurupy is situated near the coast to the north of Maranhão State ; it lies low, and the climate is humid, with two rivers, the Gurupy and the Piriá. The populations of the various villages in the district are given. The chief diseases are malaria and helminthiasis. Nearly one-third, 31·1 per cent., suffer from malaria and 86·3 per cent. harbour worms of some kind. Malaria prevalence is greatest in June–August, the transition period from winter to summer when countless breeding pools for mosquitoes are present after the torrential rains. Benign tertian is far the commonest form, subtertian is rare and quartan very occasionally seen. Measures directed to getting rid of breeding sites were deemed impracticable, so treatment of the people was taken in hand, by means of atebrin and plasmoquine. For this to be carried out efficiently, there is need for 3 sanitary posts to be established in the municipality of Vizeu, at which large stocks of the drugs are to be kept. [The malaria question only is dealt with in this article, that of helminthic infestation will probably be considered later.] *H. H. S.*

CORRÊA (Renato). Informações sobre a malaria na colonia japoneza de Tietê. (Estação de Lussanvira.) [**Malaria in the Japanese Colony of Tiete, Brazil.**]—*Ann. Paulist. Med. e Cirurg.* 1936. Aug. Vol. 32. No. 2. pp. 131–142. With 4 figs.

An interesting informative account of living conditions in the Japanese agricultural settlement of Tiete, Brazil. The settlement has a population of 5,346, all but some 200 being Japanese immigrants. There was a relatively severe outbreak of malaria in 1935, 11·7 per cent. of the population being attacked. The disease is much less in evidence this year. The most important vector is *A. albitarsis.* *N. W.*

HODGKIN (E. P.) & JOHNSTON (R. S.). **Malaria at Batu Gajah, Perak : transmitted by** *Anopheles barbirostris* **Van der Wulp.**—*Bull. Inst. Med. Res. Federated Malay States.* 1935. No. 1. 19 pp. With 1 folding plan, 1 chart & 3 figs. on 2 plates.

Though individual specimens of *A. barbirostris* have previously been found infected in Malaya and in Sumatra this is the first report of that mosquito being the chief malaria vector in an endemic centre in Malaya.

Batu Gajah is a township with a population of 6,759 in the tin-bearing valley of the Kinta River some fifty miles from its mouth. Unbroken overgrown swamps extend for two miles to the west of the town. These swamps are the chief source of the large and varied anopheline fauna. The breeding of *A. maculatus* and other stream breeders has been controlled and until recently there was but little malaria in Batu Gajah. Since 1929 the incidence of malaria has increased considerably: in 1934 the fresh malaria cases amounted to 2·5 per cent. of the population.

The anophelines found included *aconitus*, *annularis*, *barbirostris*, *hyrcanus* var. *nigerrimus*, *hyrcanus* var. *sinensis*, *philippinensis*, *subpictus* var. *malayensis* and *vagus*. In 1933 of 914 *barbirostris* caught in the town and dissected 26 were found infected. In 1934 seven out of 667 were infected. The only other infected anophelines found out of large numbers dissected were a single specimen of each of the two varieties of *hyrcanus*. *A. aconitus* was very prevalent but none was found infected.

The proportion of *barbirostris* larvae found was small when compared with the number of adults captured. This is probably explained by the inaccessible nature of its chief breeding places in overgrown swamps which were difficult to approach even by boat. In 1934, *barbirostris* formed 31 per cent. of the adult anophelines captured but only 5 per cent. of the anopheline larvae found.

The measures now being taken to deal with the problem include the filling of swamps by pumping sand from the river bed by means of a suction dredger. *N. W.*

GREWAL (R. S.). **Spleen Index and Other Malarial Problems of Remote Villages along the Arakan Coast of Burma.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Nov. 28. Vol. 30. No. 3. pp. 379–382.

The main interest of this brief note lies in the fact that very little is known of the health conditions of the not easily accessible villages situated along the Arakan Coast of Burma. The country is very hilly and thickly wooded; modern facilities of communication are non-existent. The annual rainfall varies between 170 and 250 inches. Villages are situated on the sandy sea-shore or at the foot of the hills. The author visited eleven villages in which he examined 1,541 children for enlargement of spleen. The spleen index was 11·5. In one village at the foot of the hills 24 of 28 children had enlarged spleens. No collection of anophelines was made and it was only possible to obtain nine blood films. Six films contained parasites, five *P. vivax* and one a mixed infection, *vivax* and *falciparum*. *N. W.*

FENG (Lan-Chou). **Malaria and its Transmission in Kwangsi, China.**—*Chinese Med. Jl.* 1936. Dec. Vol. 50. No. 12. pp. 1799–1814. With 1 map & 8 figs. on 4 plates. [10 refs.]

This is an account of a six weeks' tour of inspection in the Province of Kwangsi during which the author made observations on the prevalence of malaria and of anopheline mosquitoes in thirteen places representative of the different geographical conditions to be found in this Province. The report derives interest from the fact that nothing hitherto has been published regarding malaria in Kwangsi, which province lies immediately to the north of Tonking and to the east of Yunnan. The north-west part of the province is mountainous, the middle generally flat and dry, the eastern part flat and wet. In each

place visited a number of children were examined for splenic enlargement, blood smears were examined and a search made for mosquitoes, both larval and adult.

Malaria is widely but unevenly distributed. Endemic malaria is most severe in the mountainous regions. Nine species of anophelines were identified, *minimus*, *jeyporiensis* var. *candidiensis*, *hyrcanus* var. *sinensis*, *maculatus*, *splendidus*, *annularis*, *kochi*, *vagus*, and *lindesayi*. In places where malaria is endemic, *minimus* and *jeyporiensis*, one or both, are in evidence. These two species appear to be the most important vectors. *A. sinensis* appears to be the most prevalent Anopheline and though the author found one specimen exhibiting oöcysts on the stomach he would appear to be justified in concluding that it plays no important part in the transmission of malaria.

Vivax infections were more in evidence than *falciparum* in all the endemic areas. In one village of low endemicity, in which an epidemic of malaria was drawing to a close, *falciparum* was chiefly prevalent. Very few quartan infections were found. *N. W.*

LING (L. C.), LIU (K. B.) & YAO (Y. T.). **Studies on the So-called** *Changch'i*. **Part II.** *Changch'i* **in Yunnan.**—*Chinese Med. Jl.* 1936. Dec. Vol. 50. No. 12. pp. 1815–1828. With 1 map & 8 figs. on 3 plates. [14 refs.]

Changch'i is malaria, chiefly subtertian malaria, according to the authors of this report, though *vivax* infections occur side by side with those of *falciparum*. Changch'i has been the scourge of Yunnan from time immemorial; it has retarded the economic development of a province very rich in mineral resources and is responsible for the backward conditions prevailing. Changch'i is very widespread, prevailing everywhere except in the northern and north-eastern parts of the Province and the territory immediately surrounding Kunming (Yunnanfu) the capital. The indigenous populations ascribe the disease to a variety of causes, toads, eels, butterflies, but most commonly to the inhalation of poisonous gas arising from decaying vegetable matter in the valleys.

The observations described in this report were made during a journey from Kunming to the Burmese border, a distance of 700 miles, which occupied from November 10th to January 24th, 1936. Inquiries were made in 27 places on the way. Parasite indexes varied between 7·6 and 68, spleen indexes between 12 and 100. Near the Burma frontier much quartan fever was observed. The authors have shown beyond question that changch'i in Yunnan is malaria and that the malaria problems of Yunnan are of great importance and complexity. Nine species of anophelines were found:—*hyrcanus* var. *sinensis*, *hyrcanus* var. *nigerrimus*, *philippinensis*, *vagus*, *aitkeni*, *minimus*, *maculatus*, *jeyporiensis*, and *barbirostris*. *N. W.*

GUIDETTI (Carlo). Geografia medica in rapporto alla malaria nel basso Giuba.—*Riforma Med.* 1936. Dec. 19. Vol. 52. No. 51. pp. 1731–4, 1737–9, 5 figs. [12 refs.]

RAMSAY (G. C.) & MACDONALD (G.). **The Species Control of Anophelines in India.**—*Indian Med. Gaz.* 1936. Dec. Vol. 71. No. 12. pp. 699–710. With 3 figs. [55 refs.]

It is now generally recognized that in any one part of the world a single species of Anopheles is often the only vector of malaria, and

existing knowledge of the biology of this important species permits the field worker to plan effective control. The authors feel it desirable to collect what is known about those species which carry malaria in India. Of the 43 species occurring in India, sporozoites have been found in nature in 12, of which the following 9 are regarded as important and dealt with in the present paper :—*Anopheles minimus, fluviatilis, varuna, culicifacies, sundaicus, stephensi, philippinensis, annularis,* and *pallidus.*

In order to indicate the scope of the paper, one may select the information which is given about *A. minimus*, a species with which both authors are exceedingly familiar. They summarize what is known about its geographical distribution and importance as a vector. This is followed by information about breeding places in the dry season and the rains, with particular reference to the presence of silt in the water and shade on the land surrounding them. They deal with seasonal abundance in particular relation to low temperatures in the cold weather, feeding habits and abundance in houses. Having summarized these topics they pass to control, based on a precise knowledge of the breeding places, and often attained by shading small streams by planting strips of thick shrubs along the banks ; the occasional use of bamboo matting is also dealt with, as is the damming of streams to form a series of small locks provided with sluices. A section on the relation of this insect to the cultivation of rice follows.

The authors discuss certain lines of work which appear to require further study. Throughout the paper the reader perceives clearly how broad have been the enquiries and how many the workers who have made it possible for the sanitarian to advise his measures of control. The paper concludes with a long list of references.

P. A. Buxton.

RICE (E. Milford) & MOHAN (Badri Nath). *A. minimus* **in Assam, its Cold Weather Bionomics and their Relationship to Anti-Larval Control.**—*Records of the Malaria Survey of India.* 1936. Dec. Vol. 6. No. 4. pp. 557–594. With 1 graph. [16 refs.]

The questions at issue are whether *Anopheles minimus* continues its normal activities during the cold weather, and whether operations against it should be allowed to cease at that season.

Working in Upper Assam the authors liberated eggs in a floating cage in a stream ; they found that all through the cold weather the larvae feed and grow so that even in January the total duration of the aquatic stages was only about 38 days. They describe other observations and experiments which show that the female feeds and deposits fertile eggs in the cold months, and that numbers of adults may be found in nature. It seems then that they have clearly established that though no doubt all vital activities are retarded, the insect does not become inactive at any stage, even in the coldest month, at the place where the work was done. The authors conclude that it is a mistake to regard this mosquito as a species which carries malaria only in the hot months : measures directed against its breeding places should come into operation in January.

The authors are perhaps inclined to attribute too much value to small numbers of observations to which no critical tests for significance have been applied. They describe, for instance, an experiment in which five batches of this insect were bred from the egg between

December and the end of March, from each of which they obtained between 22 and 40 adults; but on this slender evidence they are inclined to suggest that the sex ratio may be affected by temperature. It is also doubtful whether the apparent reduction in the proportion of adults found to contain sporozoites requires any explanation: is it not best accounted for as a sampling error? *P. A. B.*

CHOWDHURY (K. L.). **Three Years' (1933 to 1935) Malaria Control Work in Calcutta.**—*Records of the Malaria Survey of India.* 1936. Sept. Vol. 6. No. 3. pp. 467–481. With 1 graph & 1 map.

This report describes the work being done by the Calcutta Municipal Corporation to control malaria, and the results obtained. There are three anopheline vectors of malaria in Calcutta, *A. stephensi*, *A. varuna* and *A. sundaicus*; of these *A. stephensi* is by far the most important. In 1932 the spleen index was 1·73 and the parasite index 2·6. In 1935 these indices were 0·84 and 0·64. *N. W.*

i. WHITE (R. Senior), LAL (R. B.), ADHIKARI (A. K.) & SWAROOP (Satya). **Some Experiments with an Automatic Mosquito-Catching Machine: the Entoray.**—*Records of the Malaria Survey of India.* 1936. Dec. Vol. 6. No. 4. pp. 595–629.

ii. WATS (R. C.) & BILDERBECK (C. L.). **Some Experiments with "Entoray" Machine as an Anti-Mosquito Measure.**—*Ibid.* pp. 549–555.

The Entoray is a proprietary apparatus for attracting and killing mosquitoes and other insects. The principle on which it works is that a mercury vapour lamp is intended to attract the insects within the range of an electric fan which sucks them down a pipe and into a box of wire gauze. Advertisements of the machine are extremely familiar to students of malaria, but little or no scientific work on it appears to have been published. The two papers under review describe tests which have been carried out with great care in Calcutta and Bombay, machines having been lent for the purpose by the manufacturer.

i. In a preliminary experiment in Calcutta the machine caught mosquitoes belonging to 26 species; 75 per cent. of the insects being *Culex*, 10 per cent. *Anopheles annularis*, 2·8 per cent. *A. subpictus*: 10 other species of Anopheles occurred, all of them rarely.

The authors then stained mosquitoes and released them on an open racecourse at measured distances from the machine. The recoveries were very few; for instance, of 843 *Culex* released at 500 yards, only 6 were recovered. The machine was, incidentally, within 300 yards of several catching stations which had been under regular observation for five years. In this position it was run for two months; the figures, which are recorded in full and analysed in an appendix, do not show any reduction in the number of mosquitoes found in the catching stations. Figures from catching stations elsewhere in Calcutta indicate that the season was a normal one. It seems that those figures must be accepted as disposing of the claim that the machine can reduce the numbers of mosquitoes, even in a limited area.

The authors point out that some such machine as the Entoray may yet prove of great value for purposes of research. With it they have already obtained much new information about the mosquitoes at

Calcutta, in spite of the large amount of work that has already been done by other methods; for instance, the machine collected large numbers of *Anopheles annularis*, a species hardly ever found resting in houses; it also collected specimens of 5 species of mosquitoes previously unknown in Calcutta. On the other hand, it failed to catch any *A. stephensi* in an area in which breeding places of that insect were abundant.

The authors also describe some interesting experiments in which mosquitoes caught during certain periods of the night are recorded separately.

ii. Work carried out in Bombay supports that reported more fully from Calcutta. Large numbers of mosquitoes were stained and released, even so near the machine as 10 yards, but the number of recoveries was very small. On one occasion out of 155 mosquitoes released one only was recovered during the three following nights. During the same period the machine captured 181 unstained mosquitoes. It also collected considerable numbers of other insects, many of them assumed to be beneficial to man. *P. A. B.*

SICAULT (G.) & MESSERLIN (A.). Note sur la destruction des larves par les naphtes et sur l'activation des mazouts. [**The Destruction of Larvae by Mineral Oils and the Activation of Such Oils.**]—*Bull. Soc. Path. Exot.* 1936. Nov. 18. Vol. 29. No. 9. pp. 1023–1032.

Discordant results obtained in the use of various crude oils as mosquito larvicides in Morocco led the authors to undertake the observations described in this paper. They consider that the death of larvae after oiling is not due solely to asphyxia; the toxicity of the oil used plays a preponderating rôle. [In this connexion see this *Bulletin*, 1937, Vol. 34, p. 171.]

Of the various products obtained by the fractional distillation of crude oil the earlier fractions act most rapidly. Among the substances capable of reinforcing the lethal action of heavy oils used as larvicides are the oleoresin of pyrethrum, 0·1 per cent. with gas oil; paradichlorbenzene, 0·5 per cent., and naphthalene 0·25 per cent. The last is now being used by the authors: it is cheap and its use, in the dilution noted, results in the destruction of all larvae in less than an hour and a-half. *N. W.*

SOKOLOV (N. P.). L'acclimatisation du *Gambusia patruelis* en Asie centrale. [**Acclimatization of *Gambusia patruelis* (*affinis*) in Central Asia.**]—*Riv. di Malariologia.* Sez. I. 1936. Vol. 15. No. 5. pp. 325–344. With 11 figs. [25 refs.]

Gambusia had been acclimatized in most countries of Southern Europe as well as in China, Japan, Siam and elsewhere. It was imported into the U.S.S.R. from Italy and thence all over the country—Transcaucasus, Daghestan, Azov and Black Sea, the Southern Ukraine, Moscow, etc., In 1935 experiments were made to test their antilarval efficacy in rice fields. The fish throve well and at two years of age were very prolific, and in one season between the time of sowing the rice and its ripening 4–5 generations might be produced. Examination of the stomach contents of the Gambusia showed that 32·8 per cent. of the total food of the adults were Anopheles larvae, 20 per cent.

Culicides ; among the young forms Anopheles larvae constitute nearly double that of adults, *viz.*, 64·8 per cent. [These are the figures given by the author, but it must be noted that the total " per cent." of the food constituents stated in a table is well over 100.] With a stock of 2–3 specimens per sq. metre of the rice-fields 90 per cent. of the Anopheles larvae were exterminated, as compared with control fields without Gambusia. *H. H. S.*

SOKOLOV (N. P.) & CHVALIOVA (M. A.). **Nutrition of *Gambusia affinis* on the Rice Fields of Turkestan.**—*Jl. Animal Ecology.* 1936. Nov. Vol. 5. No. 2. pp. 390–395. With 5 figs. [12 refs.]

The authors have attempted to provide quantitative information about the food of the larvivorous fish Gambusia which has been introduced successfully into rice growing districts in Turkestan.

A large number of fish were collected at different dates throughout the summer and at different times of day and the stomach contents were analysed quantitatively. It was found that the most generally distributed type of food was larvae of Anopheles, which were present in one-third of the adults and two-thirds of the young fish. Larvae of many other types of aquatic insects were also very frequently encountered. None of the fish had been living on an exclusively vegetable diet, though microscopic plants were found in about 13 per cent. of the adult and small fish. The authors very rightly point out that this type of information, though interesting, gives no clear idea of the value of Gambusia as a destroyer of larvae of Anopheles. They therefore carried out experiments on the rate at which the fish digests larvae after it has fed upon them in an aquarium at a known temperature, been removed to clean water and killed for examination after a particular interval of time. It was demonstrated that at 30°C. a complete circle of digestion took place in three or four hours, after which time the insect larvae had been completely absorbed or discharged from the stomach, except that chitinous parts might still be found. It appeared that the rate of digestion in adult and young fish was approximately identical.

The abundance of larvae of Anopheles was compared in different parts of the rice field, in some of which Gambusia was present. In the absence of Gambusia about 10–15 Anopheles larvae per sq. metre were found in July, the number rising very rapidly through August, and reaching about 90 in early September. In the presence of Gambusia the average density of the Anopheles larvae was 3·6 per sq. metre, the highest figure observed being 5·2. The authors concluded, therefore, that Gambusia exterminated 80–90 per cent. of the larvae. *P. A. B.*

PRASHAD (B.) & HORA (S. L.). **A General Review of the Probable Larvivorous Fishes of India.**—*Records of the Malaria Survey of India.* 1936. Dec. Vol. 6. No. 4. pp. 631–648. With 7 plates. [36 refs.]

The contents of this paper are indicated by the title. The authors give a full summary of existing knowledge so far as it relates to India, and then discuss those fish which are known to destroy mosquito larvae or which may be supposed to do so. This part of the paper is illustrated by 30 excellent line drawings.

The paper has considerable general interest, for though its scope is limited to India it is written by zoologists whose point of view is a little different from that of the student of malaria. *P. A. B.*

MULLIGAN (H. W.) & MAJID (S. Abdul). **Some Notes on the Care, Transportation, and Use of** *Gambusia affinis* **under Indian Conditions.**—*Records of the Malaria Survey of India.* 1936. Dec. Vol. 6. No. 4. pp. 537–547. With 3 figs. on 1 plate.

As its title implies this paper is of local importance only. In India Gambusia has proved a useful adjuvant to other measures of mosquito control in certain conditions. *N. W.*

COLLIGNON (E.). La campagne antipaludique de 1935 en Algérie (partie orientale du département d'Alger et département de Constantine).—*Arch. Inst. Pasteur d'Algérie.* 1936. Sept. Vol. 14. No. 3. pp. 391–406. With 18 figs. on 9 plates.

SCHÜFFNER (W. A. P.) & ESSEVELD (H.). Bijdrage tot het vraagstuk der perniciositeit van de Laverania malariae. [**Observations on the Malignancy of Malignant Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Nov. 24. Vol. 76. No. 47. pp. 3038–3045. With 2 charts & 4 figs. on 2 plates.

One cause of malignancy in malaria is attributable to differences in the proliferation of the parasite. In the case of benign tertian and quartan, increase of parasites occurs up to a maximum in geometrical progression ; then comes a period at which the parasites remain level, for which various reasons have been put forward, such as that in some sporulations no merozoites are viable or that in each sporulating form only one merozoite is fitted to carry on. The parasite graph finally descends, with the development of immune bodies. Contrast this picture with the case of pernicious malaria and its parasite, which is not subject to body influence and may proliferate, in some cases, continuously. This leads to such extensive erythrocyte destruction that death results.

Another cause of malignancy, however, is the tendency of the parasite to develop in the capillaries of internal organs which, when it occurs in the brain, leads to coma and death. How it is that in this affection the parasite-infected erythrocytes come to be fixed in the blood vessels is controversial matter. The authors favour the view that as the plasmodium becomes more mature it develops a tendency to become fixed on the endothelium of the vessels.

The occasion of these observations on the cause of malignancy arose when a blood film, one of a regular series, was received in the laboratory. It showed, under low power examination distinct clumping of erythrocytes. In appearance the clumps were reminiscent of those seen in the estimation of blood groups. These clumps were made up of agglomerated red cells, each of which contained a rather large parasite, and the group was surrounded by non-parasitized erythrocytes. A special enquiry elicited the fact that the patient, whose blood, for the film, was procured during life, died, after temporary improvement, in a state of deep coma. Thus the clumping was not a post-mortem effect. It could scarcely have been general in the

entire circulation or embolism would have been continuous and no temporary improvement would have been shown. Various possibilities are considered for this phenomenon of clumping, which may be very closely related to the cause of the pernicious character of malignant malaria. If this phenomenon was not universal but confined to cutaneous vessels and internal organs, it would explain the clumping shown in a film taken from the skin. Another explanation of the clumping may lie in the formation of agglutinins. No further information is forthcoming in the present instance on the state of the circulating blood which could serve as control on these suppositions and it is desirable that, in the event of such a pernicious case occurring, a special examination should be made of the blood from a large vein or even artery.

W. F. Harvey.

HELMINTHIASIS.

BOLAÑOS (José Ma.), KOURÍ (Pedro) & ANIDO (Vicente). El parasitismo intestinal en los indigentes del campamento de Tiscornia. [**Intestinal Parasitism among the Natives of Tiscornia (Cuba).**] —*Rev. Parasit., Clin. y Lab.* Habana. 1936. July–Aug. Vol. 2. No. 4. pp. 601–609.

In 1935 the authors examined 200 Chinese immigrants to determine the degree of intestinal parasitism [see this *Bulletin*, 1936, Vol. 33, p. 558]. They are now undertaking a similar investigation of the indigenous population of Tiscornia. The total population is only 500 and the present article deals with 150 examined up to the present. It seems hardly worth while to publish an interim report on so few, but brief mention may be made of results to date. Of the 150 there were 117 found to be harbouring parasites, 78 per cent. Willis's method was employed. Protozoa were present in 70, helminthic ova in 90 and both in 43. Of the worms Trichuris was the most frequent, in 73, Ascaris next, 38, Necator in 15. Of protozoa *E. coli* was found in 26, *Giardia lamblia* in 25, *Endolimax nana* in 18, Chilomastix in 3, *E. histolytica* in 2. *H. H. S.*

CALVÓ FONSECA (Rafael), KOURÍ (Pedro) & BASNUEVO (José G.). Porcentaje y distribución geográfica del parasitismo intestinal en Cuba. [**Intestinal Parasitism in Cuba.**]—*Medicina de Hoy.* Habana. 1936. Oct. Vol. 1. No. 9. pp. 393–397.

A small number of individuals, 140 in all, from Bolondrou in Matanzas Province were examined for intestinal parasites [method of examination not stated]. The ages of 15 only are mentioned and these ranged between 1 and 13 years, whether the rest were adults or all were children or adolescents is not known. Briefly, 97 of the 140 (69 per cent.) were positive ; 9 had protozoa ; 88 had helminths. Trichuris was the most frequent, 66 cases, Ascaris 34, Necator 9, Enterobius and *Taenia saginata* each once. *Entamoeba coli* was found in 23, *E. histolytica* and *Giardia lamblia* each 3 times. *H. H. S.*

DA SILVA (Candido). Infestação por helmintos intestinaes em creanças de idade escolar em Teresina (Piaui). [**Helminthic Infestation among School Children in Teresina, Piauhy (S. America).**]—*Hospital.* Rio de Janeiro. 1936. Nov. 8th Year. Vol. 2. No. 11. pp. 1331–1338. With 2 charts. [10 refs.]

The author examined, by Willis's technique, the stools of 1,865 school children between 7 and 12 years of age in Teresina. He found ova of helminths in all but 229, *i.e.*, 88 per cent. positive. Of the total there were 1,115 or 68 per cent. with one parasite only and 1,027 of these harboured *Necator americanus* ; 448 or 27.4 per cent. had two, the commonest (421 cases) being Necator and Ascaris ; 75 or 4·5 per cent. had three (Necator, Enterobius and Trichuris, 43 ; Necator, Ascaris and Trichuris, 28) ; 2 had all four of those mentioned. Among all those with parasites 94·3 per cent. harboured Necator, 32·1 per cent. Ascaris, 5·9 Trichuris, 3·6 Enterobius, and just under 1 per cent. Strongyloides. Among the children in 5 suburban schools the average infestation was 93·4 per cent., among those at 4 central schools 79·6 per cent. *H. H. S.*

NOLASCO (J. O.) & GACOBA (C.). **Helminthiasis in Pupils of the Balala Elementary School.**—*Monthly Bull. Bureau of Health.* Manila. 1936. July. Vol. 16. No. 7. pp. 277–280.

Faecal examination of 208 children of this school had the results given here.

Examination was by smear and, if this were negative, by floatation in brine and glycerine. The positive percentages were Ascaris 62·5, Trichuris 57·7, hookworm 4·8, threadworm 0·9. [Seeing the real or virtual visual disappearance of hookworm eggs in glycerine it will be well to take the percentage figure of that infection with special hesitation.] *Clayton Lane.*

CHU (Tso-Chih), LIU (B. C.), LING (C. Y.) & ZEE (G. F.). A Survey of Intestinal Parasites in the Rural Experimental Health Area at Kao-Chiao, Shanghai.—*Chinese Med. Jl.* 1936. Sept. Vol. 50. No. 9. pp. 1243–1254. [13 refs.]

TALAMONTI (Luigi). Ricerche sul parassitismo intestinale dei bambini della Provincia di Modena. [**Intestinal Parasitism in Children in Modena.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Nov. Vol. 17. No. 11. pp. 690–697.

Judging from the small number examined, 150, infestation of children in Modena by parasites is very high. Only children up to 12 years of age were examined, by direct smear of the faeces or Fülleborn's or Telemann's methods. One hundred and fifteen, or 76 per cent., were found positive. Trichuris was commonest in 90 (60 per cent.), Ascaris next, 59 (39 per cent.); in 52 two parasites were present, one in 32 only. *Giardia lamblia* was found in 8, *E. histolytica* in 3; Taenia was not found, nor hookworm. Among those below 2 years of age 28 per cent. were positive; from 3–6 years 83 per cent., and from 6–12 years 87 per cent. [but the total in each group is not stated], none was found in sucklings. *H. H. S.*

MARIANI (G.) & LOPRESTI (A.). I parassiti intestinali della popolazione bianca in Somalia (dati statistici e considerazioni patogenetiche). [**Intestinal Parasitism among the White Population in Somalia.**]—*Ann. d'Igiene.* 1936. Nov. Vol. 45. No. 11. pp. 481–496. With 1 chart. [29 refs.]

During the twelve months July 1935–June 1936 the author examined [method not stated] the faeces of (A) over 1,600 persons with intestinal symptoms and (B) another 100 healthy subjects to determine the presence of protozoal parasites. He found 10 with *E. histolytica*, 8 among the first group and 2 in the second; 3 with *E. minuta* (1 in A, 2 in B); 7 with *E. dispar* (2 in A, 5 in B); 66 with *E. coli* (23 in A, 43 in B); 38 with *Endolimax nana* (12 in A, 26 in B); 29 with *Giardia lamblia* (14 in A, 15 in B); *Trichomonas intestinalis* 75 (36 in A, 39 in B). It will be seen that in every case the proportion was higher, usually very much higher, among those presenting no symptoms of intestinal disturbance. *H. H. S.*

CABALLERO (Eduardo). Parasitos intestinales en los niños de Actopan, Hgo. [**Intestinal Parasitism among School Children of Actopan, Hidalgo (Mexico).**]—*An. Inst. Biol.* Mexico. 1936. Vol. 7. Nos. 2 & 3. pp. 373–384. With 8 figs. English summary (10 lines).

The total number examined, 111, is small for general deduction, but the results show that the incidence of parasitism is high. The method of examining the stools is not mentioned, presumably it was that of direct smear. Twenty-three only were free. Of helminthic infestations the commonest was *Ascaris lumbricoides* (23 per cent.), *Trichuris trichiura* and *Hymenolepis nana* next (each 15 per cent.), then *Taenia saginata* (4), *Enterobius vermicularis* (2), *T. solium* and *Fasciola hepatica* (each 1 per cent.).

Of protozoal findings 63 per cent. were *E. coli*, 4 per cent. *G. lamblia*; *E. histolytica* and *Iodamoeba* each 1 per cent. Flagellates, not defined, were found in 35 per cent. The author states that hitherto *F. hepatica* had been looked upon in Mexico as a parasite of domestic animals only, not of man. *H. H. S.*

BLANCARDI (C. F. E. A.). A propos d'un nouveau foyer de bilharziose vésicale marocaine. [**A Fresh Focus of Urinary Schistosomiasis in Morocco.**]—*Rev. Service Santé Milit.* 1936. Oct. Vol. 105. No. 4. pp. 547–559.

The new focus is Assa, the most advanced post in South Morocco. *C. L.*

MILLS (E. A.), MACHATTIE (C.) & CHADWICK (C. R.). *Schistosoma haematobium* **and its Life Cycle in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Nov. 28. Vol. 30. No. 3. pp. 317–334. With 2 plates. [18 refs.]

The snail host in Iraq is *Bulinus truncatus* whose habitat is ditches and stagnant pools, and there is heavy infection in man and snail in the Baghdad area, the time of great risk to man being June to October and of little risk December to May. The cycle of development has been traced from the egg of *S. haematobium* in the urine through *B. truncatus* to white mice, but guineapigs seemed immune. Many species of snails, identified by Major CONNOLLY and including 11,300 *Lymnaea tenera euphratica* were examined and are listed, but no infection was seen in any of them. *C. L.*

GREPPI (Enrico). Le splenomegalie egiziane da bilarziosi nei loro caratteri ematologici e nel loro significato fra le sindromi bantiane. [**Egyptian Splenomegaly and Banti's Syndrome.**]—Reprinted from *Minerva Med.* 1934. Nov. 10. 25th Year. Vol. 2. No. 45. 8 pp.

Splenic anaemia, or Banti's syndrome, as seen in Italy and Sicily has similarities to Mansonian and probably Japonic schistosomiasis.

BANTI described the splenic enlargement of splenic anaemia as a "fibroadenia" pure and simple. Its most important haematological characters are: an increase in the total plasma (held not to be a temporary hydraemia but a hyperplasia), decrease in red cells due in

part only to the increase in plasma, this increase in plasma persists after taking out the spleen, there is no sign of haemolysis. Moreover, on injection of adrenalin the spleen contracts, but not to normal, so that its enlargement is partly caused by the spleen having in it a greater amount of blood than normal and partly by an increase of what is said in one place to be an increase in stroma and in another one of fibrous tissue.

Greppi reports that E. BUCCIANTE of the Italian Hospital, Alexandria, has obtained the same results after adrenalin injection in Mansonian schistosomiasis, his 3 patients including one in whom the spleen had been removed. BANTI's conception of the splenic state being one of "fibroadenia" pure and simple is not then correct, and even should there be no contraction (Greppi has seen no such case in 8 years' investigation) this might be due to complete obstruction of the splenic circulation without collaterals, possibly to a momentary insensibility of the patient, or to fibrosis. Greppi believes that the splenic conditions caused by *S. japonicum* will prove to be of the same kind. As to Italian cases there are three possibilities of practical importance: (1) they are cases of schistosomiasis imported from Africa, (2) they are autochthonous cases in the area from Rodi to Sicily, (3) some other infective agent causes the same syndrome. Splenic enlargement from *Pentastomum denticulatum*, which has been seen in Italy, must be kept distinct. *C. L.*

ABDEL SHAFY MOHAMED. **A Fatal Case of Massive Bilharzia Mansoni Infection. (Acute, Fatal Egyptian Splenomegaly.)**—*Jl. Egyptian Med. Assoc.* 1936. Dec. Vol. 19. No. 12. pp. 749-762. With 4 figs.

An acute case of infection with *S. mansoni* in a girl of 12 who had been infected for 7 to 8 months.

There was widespread distribution of worms and eggs in liver, omentum, mesentery, abdominal lymph nodes, jejunum, ileum and large intestine, pancreas. The lungs were noteworthy, being studded with miliary nodules from the size of a pin's head downwards composed of one or more ova with fibrocellular tissue rich in eosinophil cells and an occasional giant cell capping an ovum. *C. L.*

SUAREZ (Ramon M.) & BENITEZ GAUTIER (Clemencia). **The Sternal Marrow in Schistosomiasis Mansoni Chronic.**—*Bol. Asoc. Med. de Puerto Rico.* 1936. Dec. Vol. 28. No. 12. pp. 301-304.

A report from Porto Rico of 10 cases of advanced intestinal schistosomiasis in which during life sternal marrow was aspirated and venous blood removed at the same time.

"All the cases exhibited marked splenomegaly, evident signs and symptoms of liver cirrhosis and clinically and haemotologically they were undistinguishable from the so-called splenic anaemia or Banti's syndrome." The percentages of nucleated cells in the marrow (minimum, average and maximum) are these: megaloblasts 0, 0·64, 1·2; early erythroblasts 0, 1·36, 2·6; late erythroblasts 0·6, 3·76, 11; normoblasts 11·6, 22·76, 38; myeloblasts 0, 0·78, 1·4; promyelocytes 2·2, 4·36, 11·4; neutral myelocytes 18·2, 25·28, 36; eosinophil myelocytes 2·4, 7·38, 15·2; basophil myelocytes 0, 0·2, 0·6; neutrophil polynuclears 10·6, 29·68, 45·2; eosinophil polynuclears 0, 0·84, 2·4;

monocytes 0, 0·02, 0·2; lymphocytes 1·6, 2·94, 5·6. As compared with normal marrow there are more normoblasts and immature granulocytes and fewer mature granulocytes. When these nucleated elements are grouped as erythroblastic, myeloblastic and lymphoblastic, there is a fall from 10 to 2·94 in the percentage of the last in schistosomiasis and slight rises in the others. *C. L.*

ROBERTSON (R. C.). **Schistosomiasis in the Foochow Area.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1555–1560. With 8 figs. on 4 plates.

In effect Robertson gives a summary of the work on splenomegaly done in and near Foochow City.

Patients with enlarged spleen have for some time been coming into Foochow City and diagnosed as splenic anaemia or Banti's disease. They were undernourished with fever and chills but malaria could generally be set aside; some had a history of bloody diarrhoea. Loss of weight and energy went steadily on. Schistosomiasis was believed to be absent from the area. The complement fixation test was suggestive of schistosomiasis. The first spleen examinations showed no ova, "fibrosis of the reticulum as noted in Banti's disease was observed, some normoblasts were seen in the sinuses. Fibrosis of the capsule was rather marked as from some old irritation locally, either parasitic or bacterial?" It was felt that the spleen was infected secondarily, and when the liver from a patient who died after splenectomy was sectioned schistosome ova were found in it. They were then seen in the spleen of an acute case with much ascites. Inquiry was next made in the village, where a *Blanfordia* snail was present, naturally infected with cercariae indistinguishable from those of *S. japonicum*. Faecal examination showed many of the inhabitants to be infected. *C. L.*

CAMPBELL (Horace Emerson). **Splenomegaly in the Foochow Area with Special Reference to Schistosomiasis, and its Relationship to Cryptogenetic Splenomegaly (Banti's Disease). A Preliminary Report.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1561–1576. [14 refs.]

In Campbell's view most of the so-called Banti's disease of the Far East is schistosomiasis.

In the Foochow Christian Union Hospital, Foochow, Fukien, ova of *Schistosoma japonicum* had never been found in the stools, of knowledge of this infection in that area there was none, and the conclusion was come to that some other clinical entity was the cause of the large spleens, often with positive "formalin" and "water" tests, which were seen there. But R. C. ROBERTSON wrote that before accepting a diagnosis of Banti's disease schistosomiasis must be ruled out, for in his findings almost every case of "Banti's disease" in Hankow area proved to be schistosomiasis. So splenectomy was begun and the consistent pathological reports on them from two laboratories were "Banti's disease." Then Professor H. H. LOUCKS of Peking, on visiting the hospital told of a simple and safe method of liver biopsy during splenectomy; and since then ova of *Schistosoma japonicum* have been got from 3 of 6 livers by autopsy or biopsy. No schistosome eggs were seen in the faeces of any of the persons on

whom splenectomy was done, but, because floatation methods had been used, this is not proof of their absence. Since there has been in use the method of hatching out miracidia [see ANDREWS, this *Bulletin*, 1935, Vol. 32, p. 627] " we are more successful." Campbell's belief is that schistosomiasis that has reached the stage in which it is confused with splenic anaemia will be treated with success only by splenectomy and specific drug therapy; and he urges on pathologists, making autopsies on such cases, a detailed search for the worms themselves when no eggs have been seen.

As to the surgical viewpoint: of the 13 patients the spleen in one was so fixed that it had to be left, of the other 12 two died of haemorrhage from liver or diaphragm and one from mesenteric thrombosis and in two of the three there was marked ascites. In the other nine there was improvement, sometimes striking. If during operation the blood platelet count rises after delivery of the spleen the advice given is that the splenic artery should be tied and the spleen put back.

C. L.

KAU (L. S.). **Histological Studies of Splenomegaly with Special Reference to Material from the Foochow Area.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1577–1584. With 8 figs. on 4 plates.

" Histological studies made in a series of 13 splenomegalies from patients in the Foochow area . . . In certain parts of the tropics splenomegaly may be caused by schistosomiasis infections . . . This condition has not been sufficiently studied in the past."

Detailed histological reports were made on 6 of these 13 cases, and on one other, the first in which ova were found in the faeces during life. Distorted schistosome ova were seen in all but one of the bits of liver got at biopsy, in the fibrous stroma under the capsule, in the walls of the bile canals and among the liver cells; when newly posited there were " round cells " about them; there was cirrhosis of the liver with atrophy of its cells, sometimes of a whole lobule. In the spleen schistosome ova were the exception, but in all there was fibrosis of the capsule and stroma with foci of haemorrhage, macrophages and multinuclear giant cells and what seemed to be calcium granules. Deposits of haemosiderin in some of them may have been caused by malaria or by the schistosome. *C. L.*

YAO (Y. T.). **Report on the Investigation of Schistosomiasis Japonica in I-Hsing, Tai Hu Endemic Area.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1667–1669. With 4 figs. on 1 plate.

A report from the Department of Parasitology, Central Field Health Station, Nanking, shows that Japonic schistosomiasis is present at I-Hsing as shown by clinical symptoms and the finding of ova, while *Blanfordia* snails have in them cercariae of the schistosome type.

C. L.

TANG (C. C.). **Schistosomiasis Japonica in Fukien with Special Reference to the Intermediate Host.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1585–1590. With 4 figs. (2 on 1 plate).

The distribution of schistosomiasis in villages around Futsing City is the same as that of *Katayama tangi*, a new species.

The country here is hilly and the water of irrigation, after passage over fields whose fertilizer has been human sewage, runs back again into the stream and once more is taken off for the irrigation of fields lower down the valley. Tests were made on men of 29 villages and eggs were present in men from 16 of these, the percentage of infection is put as 1·28. The snail was named by BARTSCH *Katayama tangi*† and cercariae from it gave infection to white mice and rabbits, and adult flukes identified as *S. japonicum* were later seen in them, there being 734 in a rabbit. [It will be seen that BARTSCH is not among those who no longer use the generic name *Katayama*, see this *Bulletin*, 1936, Vol. 33, p. 7 (note 7).]

" The snail in question is a small operculate gastropod. Its dextrally coiled shell consists of 7 whorls. The shell measures 7·5 mm. in its maximum height and 3·5 mm. in its maximum width. The surface of the shell is smooth with faint sculptures. The mouth is ovate, being pointed above and broadly rounded below. On the external surface of its outer lip a course ridge, the varix is very prominent. The color of the shell is reddish brown. The radula pattern is typical of the Katayamid snails. It has the formula 2.1.1.1.2. The denticulation of its central tooth can be formulated as follows : $\frac{1.1.1.}{3+3}$

" The lateral tooth has 6 denticulations of which the third from inside is much larger and longer than the rest. The inner marginal has 9 denticulations and the outer marginal has 5. The operculum has 3·2 whorls." *C. L.*

MÜHLENS (P.). 14 " Yangtse-Fieber "-Erkrankungen (Schistosomiasis japonica) an Bord eines deutschen Handelsschiffes.—[**Cases of** *S. japonicum* **Infestation among the Crew of a German Trading Vessel.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Feb. Vol. 41. No. 2. pp. 308–317. [12 refs.]

Fourteen sailors became infected with *S. japonicum* after bathing in the Yangtse at Hankow. They were variously treated with Sdt 386 (an organic arsenic-antimony compound), fouadin, emetine, tartar emetic, neostibosan. Visible eggs or miracidia came and went and it was not possible to say that any man was cured. *C. L.*

BRUMPT (E.). Action des hôtes définitifs sur l'évolution et sur la sélection des sexes de certains helminthes hébergés par eux. Expériences sur des schistosomes. [**Development of** *S. bovis* **in Various Hosts.**]—*Ann. Parasit. Humaine et Comparée.* 1936. Nov. 1. Vol. 14. No. 6. pp. 541–551. With 2 figs. [12 refs.]

A study of the effect of different definitive hosts on the development of *Schistosoma bovis.*

The cercariae used were always got from a number of snails. The host animal had an effect on the rate of growth, on the size of the parasites and on the development of one sex or the other. The size was smallest in *Macacus rhesus* and greatest in the sheep, and as to sex, there grew in the guineapig 8,705 males and 3,739 females, in *Macacus sinicus* there were, after 139 days, 43 incompletely developed females

† *Proc. Biol. Soc. Washington.* 1936. Aug. 22. Vol. 49. p. 139.

and no males, in *M. rhesus* 89 males and 40 females all very small and all females without eggs, in the rat the worms were rather larger than in *M. rhesus* but the females were sterile. *C. L.*

BRUMPT (E.). *Schistosoma bovis* et *Schistosoma mansoni* ne sont pas transmis par *Planorbis* (*Indoplanorbis*) *exustus*. Observations biologiques concernant ce planorbe (autofécondation, érosion de la coquille, élevage, etc.). [**Observations on** *Planorbis exustus*. **Its failure to act as Host of** *S. bovis* **or** *S. mansoni*.]—*Ann. Parasit. Humaine et Comparée.* 1936. Sept. 1. Vol. 14. No. 5. pp. 464–471. With 2 figs. on 1 plate. [20 refs.]

As the title shows *Planorbis exustus* is not a host of *S. mansoni* or *S. bovis*.

While of 32 *Bulinus contortus* all became infected with *S. bovis*, none of 50 young *P. exustus* became so, and while 8 of 46 *Planorbis boissyi* became infected with *S. mansoni*, none of 50 *P. exustus* did so. Self-fertilization took place in *P. boissyi* isolated from the time of hatching, fertile eggs being laid on the 64th day when they had been kept at a mean temperature of 24°C. ; but this does not affect cross-fertilization later. The lines and hollows on the shells of wild *P. exustus* are caused by their gnawing one another's shells. Development in the laboratory is easy, and lettuce, soaked in water for a day or two, is a favourite food. *C. L.*

CORT (W. W.). **Studies on Schistosome Dermatitis. IV. Further Information on Distribution in Canada and the United States.**—*Amer. Jl. Hyg.* 1936. Sept. Vol. 24. No. 2. pp. 318–333. [14 refs.]

Cercarial dermatitis is much more widely spread in the United States and Canada than has been suspected. The localities include Manitoba, Saskatchewan, Minnesota, Wisconsin, Iowa and Michigan, as well as suspicious dermatitis from North Dakota, Illinois, Nebraska, Texas, Florida and Washington. *Cercaria tuckerensis* Miller, 1927 is a new agent as a cause of this dermatitis. *C. L.*

BARLOW (Claude H.). **Is there Dermatitis in Egyptian Schistosomiasis ?**—*Amer. Jl. Hyg.* 1936. Nov. Vol. 24. No. 3. pp. 587–599. With 8 figs. on 4 plates. [15 refs.]

The answer given to the question in the title is " Yes."

Of 107 fellaheen questioned as to personal experience of dermatitis when at work, 87 said they had this. It does not affect foot and ankle, which are buried in mud, but is evenly distributed over the rest of the submerged part, and in most of those seen by Barlow there were tiny papules all over the submerged part of the leg. The itching usually lasts 3 to 5 days, with limits of 1 hour to 20 days after leaving the water, but washing in well water and then soaking in hot salt water stops all itching, and if there is no scratching, itching stops the sooner. Women washing clothes at the canal side had no itching, for, as they reasonably said, they used soap.

A number of volunteers were deliberately infected with cercariae of the schistosome they already harboured, this was done under carefully controlled conditions and after promise that they would take treatment. There is a difference in the dermatitis caused by the two species.

"*S. haematobium* produced discrete spots of swelling which later became red, leaving red spots all over the area to which the cercaria-bearing water was applied. On the other hand, *S. mansoni* produced general swelling, which later became red, leaving one large, red, swollen area where the application had been made. This swelling subsided later, leaving the papules looking just like those caused by *S. haematobium*."

C. L.

LOVETT-CAMPBELL (A. C.) & ROSE (A. W.). **Bilharzial Appendicitis in *Schistosoma haematobium* Infestations. A Preliminary Report.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Nov. 28. Vol. 30. No. 3. pp. 335–344. With 14 figs. on 3 plates.

"Bilharziasis causes its own type of appendicitis, the symptoms of which occasionally become urgent enough to warrant surgical intervention. The gross pathology encountered bears this out."

The appendix was taken out at operation in 35 persons in a hyperendemic area in Northern Nigeria. Ova of *S. haematobium* were present in the urines of all of them and in 20 of their appendices there were eggs of this parasite. The examinations for these bodies were stringent—scrapings, sections, and digestion in 4 per cent. KOH of all the otherwise unexamined part of the appendix if eggs were not seen without this. In 4 only were the colicky symptoms held to be accounted for by the gross lesions present in the appendix. These were greyish tubercles 1 to 2 mm. across on the peritoneal surface of 3, and, microscopically, eggs, round cells, "wandering cells," giant cells, fibroblasts with onion arrangement of fibres, and eosinophil cells. Some of the smaller vessels in the serosa had cuffs of round cells. The sites of the eggs were, submucosa 5, submucosa and mucosa between the gland crypts 7, submucosa and serosa 1, all coats including muscular 4, unknown 3. Where there were very many eggs there were not always gross lesions, and 2 with gross lesions had few eggs. The pseudo-tubercles are in the authors' belief formed in this way—

"The eosinophils which are concentrated immediately around the ova commence to degenerate. Very soon mononuclear cells, wandering cells, and fibroblasts range themselves around the degenerate central mass in a radial manner like the spokes of a wheel. Multinucleated giant cells, similar to those found in tuberculous tissues, make their appearance, and a confining wall of hard fibrous tissue is laid down at the extreme periphery."

Between them the condition is this—

"... fibrous granulation tissue is present infiltrated with eosinophils, fibroblasts, plasma cells, mononuclear cells, and occasional ova. Capillaries are numerous but do not seem to enter the pseudo-tubercles. It is common to find the whole appendicular wall involved in the more advanced cases in which pseudo-tubercles at all stages are seen, but the mucosa as a rule is not invaded by fibrous reaction. It may be pressed upon and the lumen distorted."

C. L.

MAINZER (Fritz). Ueber isolierte Lungenbilharziose, besonders im Röntgenbild, und ihre Differentialdiagnose gegenueber der Lungentuberkulose. [**Pulmonary Schistosomiasis and its Differentiation from Tuberculosis by X-rays.**]—Reprinted from *Fortschritte a. d. Gebiete d. Röntgenstrahlen.* 1936. Vol. 54. No. 2. pp. 154–173. With 15 figs. [13 refs.]

—— & YALOUSSIS (Evangelos). Ueber latente Lungenerkrankung bei manifester Blasenbilharziose. (Nach Röntgenuntersuchungen.) [**Latent Pulmonary Infection in Urinary Schistosomiasis.**]—*Ibid.* No. 4. pp. 373–381. With 8 figs.

In the first paper 5 and in the second 20 persons are considered as to the X-ray findings in *S. haematobium* infection and to the diagnosis from tuberculosis. It seems that, even when there were no clinical signs of affection of the lungs, there were radiographed evidences of abnormality in a quarter of the infected. *C. L.*

KAN (Huai-chieh). Further Note on the Intracutaneous Test with *Schistosoma japonicum* Antigen.—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1649–1652.

PIERI (J.) & SARDOU. A propos d'un cas de bilharziose vésicale traité par le 110 L (antimoniothiomalate de lithium). [**Urinary Schistosomiasis treated by 110 L.**]—*Marseille-Méd.* 1936. June 5. Vol. 73. No. 16. pp. 749–754.

A case of cure in a boy of 12 who had 30 cc. of lithium antimony thiomalate in all in bi-weekly doses of 1, 2 and 3 cc. and was observed for 7 weeks. There were no ill effects. *C. L.*

CAWSTON (F. Gordon). **Destruction of the Bilharzia Parasites of Man.**—*South African Med. Jl.* 1936. Sept. 12. Vol. 10. No. 17. pp. 608–610.

" Intravenous injections of antimonium potassium tartrate in non-toxic doses is the method of choice for curing bilharzia disease.

" The introduction of remedies which can be administered with less skill has resulted in many cases being treated without due regard to the condition of the escaping ova and the eosinophile counts.

" Until the investigation is carried out on an adequate number of cases it is impossible to determine what total dose of the less irritating compounds is necessary or whether certain cases may prove to be less responsive to treatment in this way.

" Persistent eosinophilia lasting for more than a few weeks suggests the possibility of pathological disorders such as carcinomatous growths occurring from an incomplete course of treatment, and the escape of even dead ova indicates that some of the parasites may not have been destroyed."

C. L.

CAWSTON (F. G.). **Bilharzia Infection in Blind Lagoons.**—*South African Med. Jl.* 1936. Oct. 24. Vol. 10. No. 20. pp. 698–699.

" Such experiences prove the need for an authoritative statement as to the control of bilharzia infection along the Natal coast."

Here is one of the experiences : " Others have brought river water contained in bottles and have even rested content with a laboratory

report that the sample was free from bilharzia infection. One might with equal logic believe that the sea was free of sharks because none were found in a sample of sea water."

C. L.

KAN (Huai-chieh) & KUNG (Jen-chi). **A Preliminary Report on the Specific Treatment of Schistosomiasis Japonica.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1637–1648. [28 refs.]

A comparison is made of the effects of sodium antimony tartrate, fouadin, and emetine hydrochloride in the treatment of Japonic schistosomiasis.

In all 352 persons were treated, but only 46 had 10 or more injections. Of 24 of them who were given fouadin (four of them also getting the tartrate) the results after treatment judged by the presence of eggs were 15 cured, 8 not cured, 1 not examined; the figures for tartrate were 18 treated, 15 cured, 3 not cured; and for emetine 4 treated, 2 cured, 2 not cured. The tartrate was the best and cheapest drug, fouadin less effective and twenty-five times as costly, while emetine was 50 times as costly and its poisoning of the heart most grave. *C. L.*

YUMOTO (Y.). **On the Minute Structure of the Egg-Shells of** *Clonorchis sinensis,* **and on its Abnormal Eggs.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1936. Aug. Vol. 35. No. 8 (377). [In Japanese pp. 1836–1844. With 6 figs on 1 plate. English summary pp. 1845–1846.]

Malformed eggs without miracidium or operculum or both are often seen. The pattern on the shell is believed to be due to varying thickness of the outer shell. *C. L.*

UJIIE (Naoki). **On the Process of Egg-Shell Formation of** *Clonorchis sinensis,* **a Liver Fluke.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1936. Aug. Vol. 35. No. 8 (377). [In Japanese pp. 1862–1894. With 4 text figs. & 5 plates (1 coloured). [27 refs.] English summary pp. 1894–1896.]

The processes of formation of the egg are studied, namely the surrounding of the egg cell by yolk cells, its fertilization, the formation of the shell and operculum, the movement of these constituents along the genital system, and the possible function of Laurer's canal.

C. L.

HSU (H. F.) & KHAW (O. K.). **Studies on Certain Problems of** *Clonorchis sinensis.* **I. On the Cysts and Second Intermediate Hosts of** *C. sinensis* **in the Peiping Area.**—*Chinese Med. Jl.* 1936. Nov. Vol. 50. No. 11. pp. 1609–1620. With 1 text fig. & 20 figs. on 9 plates. [24 refs.]

The cysts are spherical, oval or elliptical measuring 0·121–0·15 by 0·085–0·14 mm. They have two hyaline walls, the outer 3μ thick digested by trypsin acting after pepsin, the inner "thin, membranous and collapsible" actively ruptured by the metacercaria. This last is

being separately described, but has no eyespots, the excretory bladder is oblong never Y-shaped, and is filled with coarse concretions which are black by transmitted light, the cuticle is covered with delicate spines. The percentage of the sites of cysts are: flesh 87·4, skin 5·9, gills 4·7, scales 2. Their diagnosis from those of some other trematodes is made in this way—*Metagonimus yokogawai* cyst discoidal, excretory bladder Y-shaped, acetabulum laterally displaced, spines coarse; *Metorchis orientalis* outer wall of cyst 20μ thick; *M. taiwaensis* outer wall of cyst 30μ thick; *Echinochasmus perfoliatus* cyst 67μ by 74μ, excretory bladder has 2 lateral stems running forwards zig-zag. The 13 intermediate hosts are grouped in 4 classes according to susceptibility to infection. The largest number of cysts in 1 fish was 166 in *Pseudorasbora parva* or 55 to every gram of its flesh. It is commonly used raw to feed cats and dogs. *C. L.*

OTTO (Johann H.) & TSCHAN TSCHING JI. Massenansammlung von Eiern des Leberwurms *Opisthorchis sinensis* in der Gallenblase bei Verschluss der Papilla Vateri. [**Massed Ova of *C. sinensis* in the Gall-Bladder with Occlusion of the Ampulla of Vater.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Nov. Vol. 40. No. 11. pp. 516–517.

The real interest here is surgical and the fluke infection an accident. A man with this infection had a warty carcinoma about the ampulla of Vater with the bile duct as big as a thumb, the gall-bladder enlarged with about a million Clonorchis eggs in it and the liver hard and big. The gall-bladder was opened into the duodenum and the man recovered from the operation without complication, to be then lost sight of. [It is a striking fact that a second case of warty growth in this place with the same symptoms has come to the reviewer's notice within a week.] *C. L.*

OTTO (Johann H.). Zur Frage der röntgenologischen Erkennbarkeit krankhafter Veränderungen am Magen-Darmkanal bei Patienten mit *Opisthorchis sinensis*. [**X-ray Examination of Patients with *Clonorchis sinensis*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Feb. Vol. 41. No. 2. pp. 296–302. With 3 figs.

The changes shown by X-rays in those with eggs of *Clonorchis sinensis* in the faeces are adhesions between the duodenum, gall bladder, lower surface of the liver and the hepatic flexure of the colon; a dragging of the duodenum upwards and to the right; and ulceration as the result of the other changes. *C. L.*

VOGEL (Hans). Beobachtungen ueber die Lebensgeschichte von *Opisthorchis felineus* in Ostpreussen. [**On the Life-History of *O. felineus* in East Prussia.**]—*Zent. f. Bakt.* I. Abt. Orig. 1937. Jan. 15. Vol. 138. No. 3/4. pp. 250–254. With 3 figs.

Vogel adds to his observations on the life history of *O. felineus* in E. Prussia.

Of 723 *Bythinia leachi* examined 6 were infected. The fish *Tinea vulgaris* when infected has pigmented rings on the fins, the cat is an important reservoir host for man and the carriage by rain water of its faeces into streams lets infection get to the snails. *C. L.*

FUKUDA (S.) & MORIKAWA (K.). Ueber die Metagonimiasis Yokogawai in Dairen. [**Infestation by** *M. yokogawai* **in Dairen, Manchuria.**]—*Jl. Oriental Med.* 1936. Nov. Vol. 25. No. 5. [In Japanese pp. 1031–1042. [36 refs.] German summary p. 85.]

At Dairen, near Port Arthur, *Metagonimus yokogawai* infection has been found in 38 of 5,077 patients. *C. L.*

KOBA (Kazuo). **Revision of the Specific Name of a Crab as a Second Intermediate Host of** *Paragonimus westermani* **in Formosa.**—Reprinted from *Science Reports of the Tokyo Bunrika Daigaku.* Section B. 1936. Feb. 15. Vol. 2. No. 39. pp. 201–207. With 1 fig. [30 refs.]

The crab which was identified by A. TERAO in 1915 as *Potamon* (*Geotelphusa*) *obtusipes* (Stimpson), 1858 is in reality *Potamon* (*Potamon*) *rathbuni* de Man, 1914. *C. L.*

BERCOVITZ (Z.). **Clinical Studies on Human Lung Fluke Disease (Endemic Hemoptysis) caused by** *Paragonimus westermani* **Infestation.**—*Amer. Jl. Trop. Med.* 1937. Jan. Vol. 17. No. 1. pp. 101–122. With 3 figs. [77 refs.]

Of 1,108 sputum examinations made at the Pyengyang Union Christian Hospital, Korea, 108 were positive for paragonimus eggs, 190 for tubercle bacilli and 14 for both. The literature, symptoms and physical signs, pathology, diagnosis and treatment are covered.

Cough, haemoptysis, the eggs in the sputum with almost no other symptoms and practically normal physical and X-ray examinations are the rule. Other symptoms are probably caused by some other condition in the lungs. Examination of the sputum for eggs may have to be made again and again. The cell collections in the lungs are mostly of lymphocytes and plasma cells, there being few eosinophils.

"Treatment has been mainly by the use of emetine in two courses consisting of 1 grain (0·06 gram) daily by hypodermic injection for 7 days, with a period of 1 week's rest, then a repetition of the treatment. Intravenous administration of emetine is absolutely contraindicated in pulmonary distomiasis. Lipiodol oil instillations into the bronchi for diagnostic purposes seemed to give a measure of relief from the symptoms of cough, and in 1 case the patient stated that the bloody discharge was less . . . . Up to the present, it is not possible to point to a single case which has been 'cured,' although many seem to be improved. Most of these patients under times of stress and strain, fatigue, or other unfavorable conditions, again develop blood-tinged sputum in the morning, and the ova again make their appearance, even after a lapse of several years."

C. L.

SOETJAHJO (M.). Een geval van Paragonimiasis.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Oct. 20. Vol. 76. No. 42. pp. 2670–2672. English summary (2 lines).

WATT (J. Y. C.). **Incidence of Helminthic Parasites with Special Reference to the Epidemiology of Fasciolopsiasis Buski in Shiaoshan, Chekiang 1934–35.**—*Chinese Med. Jl.* 1937. Jan. Vol. 51. No. 1. pp. 77–84. With 1 map. [19 refs.]

A faecal survey of 1,120 out of 8,000 to 10,000 local villagers.

The examinations were of 3 thin smears in saline, except for a few in which Telemann's method was used. The positive percentage results were—Ascaris 38·04, hookworm 0·89, Trichuris 12·32, Fasciolopsis 83·84. Fasciolopsis infection varies with age and sex, the percentages being—in male children 91·6, in male adults 75·5, in female children 83·81, in female adults 69·22. The metacercariae of *Fasciolopsis buskii* were seen on *Zizania aquatica* as well as on water chestnuts and caltrops, but no adults were seen in cats, dogs or pigs. *C. L.*

PENSO (Giuseppe). Sull'azione della calciocianamide sopra le cercarie dei distomi. [**The Action of Calcium Cyanamide on Cercariae.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Dec. Vol. 17. No. 12. pp. 705–709.

The author tested the lethal effect of different strengths of calcium cyanamide on cercariae of *Fasciola hepatica* and of *Cercaria burti* var. *icnusae*. Solutions of the cyanamide were made in strengths of 4, 2, 1 and 0·5 per thousand and 10 cc. of each of these was added to an equal quantity of water containing the cercariae. In the case of those of *F. hepatica* the resultant 2 per thousand (*i.e.*, the 4 per thousand original) caused cessation of movement in one minute, death of most in three and of all in five minutes ; with 1 per thousand solution a few survived for 5 minutes but all were dead in fifteen. With *C. burti*, 2 per thousand killed all in 3 minutes and 1 per cent. in 5 minutes. With lower dilutions some were still alive after an hour. *H. H. S.*

CAVAZZI (Gino). L'azione della calciocianamide su varie specie di molluschi. [**The Action of Calcium Cyanamide on Various Molluscs.**]—*Arch. Ital. Sci. Med. Colon. e. Parassit.* 1936. Dec. Vol. 17. No. 12. pp. 710–713.

Tests similar to the above were tried on *Limnaea stagnalis*, *L. auricolaria*, *Planorbis corneus* and *Paludina contecta* collected at S. Germiniano, 6 kilometres south-west of Modena. A strength of 1 in a thousand killed all in half an hour and of 0·5 per thousand in one hour, higher dilutions being ineffective even in 24 hours. Larger specimens of the same, obtained at Bomporto, low lying marshes, required 1 per thousand strength acting for 12 hours. The action of the cyanamide on terrestrial molluscs was impracticable because even 1 per thousand was not lethal after 24 hours and higher concentrations injured the plants. *H. H. S.*

TARASSOV (Victor A.). Expérience acquise par cinq années d'études sur les Bothriocéphales dans la partie nord-est de l'U.R.S.S. (1931–1935). [**Results of a Five Years' Study of Diphyllobothrium Infestation in North-East Russia.**]—*Ann. Parasit. Humaine et Comparée.* 1936. Sept. 1. Vol. 14. No. 5. pp. 472–484. With 3 figs.

A campaign in Carelia has resulted in a great lessening of infection with *D. latum*.

The record is certainly on a grand scale : maximum degrees of infection in man of 63·3 to 78·2 per cent., 90 metres of tapeworm (6 worms) from one woman, 143 worms from another, a man of 100 infected for 40 years, infection in man, dog, cat and pig. By *intra vitam*

staining it has been shown that plerocercoids may be transferred from fish to fish and will develop, they may pass through the wall of the stomach into the peritoneal cavity. The plerocercoids called "Type B," found in *Coregonus albula* (*sic.*), *Thymallus thymallus, Osmerus eperlanus* are not those of *D. latum*, so these fish are not a danger to man. A campaign against infection has reduced this in man to 18·3 per cent.

C. L.

i. WARD (Henry B.). **The Longevity [of]** *Diphyllobothrium latum.*—*Parasites, Transmetteurs, Animaux Venimeux Recueil des Travaux dedié au 25-me Anniversaire Scientifique du Professeur Eugène Pavlosky 1909–1934, Moscow, 1935.* pp. 288–294. [18 refs.] Resumé in Russian on p. 294.

ii. LEIPER (R. T.). **Some Experiments and Observations on the Longevity of** *Diphyllobothrium* **Infections.**—*Jl. Helminthology.* 1936. Sept. Vol. 14. No. 3. pp. 127–130.

i. The life span of *D. latum* is discussed.

Ward had already in the De Lamar Lectures, Johns Hopkins University, 1930, given his view that infection with the broad tapeworm was much more widely spread in the United States than was generally thought, so that what were really reinfections were being put down to one long-lasting infection ; but being impressed by persistence of belief that the worm was in fact long lived, he now reviews the literature and holds that his careful analysis of many of the cases shows very clearly that there was reinfection.

Ward quotes writers from BREMSER (1819) onwards, for the conclusion that this infection lasts 6, 10, 12, 14 and 21 years, and American writers for the belief that infection could not be got in America. But when there was proof that the infection could be got in America, doubt was thrown on the long life of the tapeworm. He goes on to a discussion of the paper by LEIPER, "A cryptic infection with *Dibothriocephalus latus*" [this *Bulletin*, 1929, Vol. 26, p. 538] with the use of these words "I have been unable to find other evidence that this parasite may at times enter upon a resting stage as it were. Such an interval of inactive growth and non-productivity of eggs seems not to have been demonstrated for this species." It is pointed out that the variability of the incidence and degree of anaemia in those harbouring this parasite has led to confusion. "Unfortunately I have found no records and have been able to obtain no experimental evidence indicating definitely the age attained by individuals of the species *Diphyllobothrium latum.* To be sure in dogs it seems to persist only for brief periods although the evidence on this point is not conclusive."

ii. Leiper gives his reasons for the belief that *D. latum* did in his case live in man for 5 years.

He was in 1922 priest and victim (see Case A, LE BAS, this *Bulletin*, 1925, Vol. 22, p. 475 and 1929, Vol. 26, p. 538). He adds to earlier information with a record of his journeys and his reasons for the belief that further infection was not got on them. After treatment with carbon tetrachloride he was the only one of the three victims who did not pass as many tapeworm heads as swallowed plerocercoids ; he was one short.

"During my stay in Cairo I contracted an acute attack of dysentery and on the 8th February, 1928, as a result of a personal examination

of my faeces for *Entamoeba histolytica*, I discovered vast numbers of eggs of *Diphyllobothrium latum*. For purposes of study I retained the infection for 10 months. Not only had there been a complete absence of passage of tapeworm segments from the initial infection on 27th September, 1922, and during my illness in February, 1928, but this complete absence continued, although eggs were constantly present in the stool, until the adult tapeworm was finally removed by treatment in December, 1928. The conclusion at which I arrived was that, although the parasites had developed normally, in my case the mature segments were continually digested, whereas in the cases of my two colleagues, long portions of strobila were passed intermittently. Lest it be suggested that strobila were passed but overlooked, I may add that I have always followed the advice given by Manson to his students to observe daily the character of one's own stools as an index of intestinal health."

There was not and there was not claimed a 4-year period of "total inactivity," merely a continued absence of the passage of segments. Further during the period of 10 months between the discovery of eggs and the removal of the worm by treatment no segments were ever passed.

Leiper then gives details of a dog, a normal host for *D. mansoni*, in which this tapeworm lived for 8 years under stringent experimental conditions for the prevention of reinfection. While then the fact that infection with *D. latum* may be got in America makes long infections in Finnish, Polish and Russian immigrants a matter of some doubt, "the experimental cases cited above seem sufficient to controvert the conclusions reached by Ward from his consideration of the literature bearing upon the longevity of *Diphyllobothrium latum*."

C. L.

HERNBERG (Carl August). **Concerning the Anti-Anaemic Influence of the Gastric Juice in Pernicious Botriocephalus Anaemia.**—*Acta Med. Scandinavica.* 1936. Supp. 78. pp. 582–587. With 1 fig.

In 3 cases the effect of Castle's haemopoietic factor on this anaemia was tested.

In one who had had diphyllobothrium anaemia 22 years before and had been cured of the anaemia and freed of the worm, the gastric juice contained active quantities of the anti-anaemic factor. Another who was still harbouring the worm had a gastric juice in which this factor was reduced. On the third subject the result of the test was difficult to interpret owing to the small amount of gastric juice secreted.

C. L.

FERMOSELLE BACARDI (J.) & PORTUONDO DEL PINO (A.). *Hymenolepis diminuta.* Caso humano. [**A Human Case of Infestation by** *Hymenolepis diminuta.*]—*Rev. Parasit. Clin. y Lab.* Habana. 1936. July–Aug. Vol. 2. No. 4. pp. 629–633. With 1 fig.

The eggs were found in a specimen of faeces of a child of 7. After an anthelmintic no strobile was passed. No eggs were found later.

C. L.

MAGATH (Thomas B.). **Hydatid (Echinococcus) Disease in Canada and the United States.**—*Amer. Jl. Hyg.* 1937. Jan. Vol. 25. No. 1. pp. 107–134. With 2 figs. [73 refs.]

Only once in about 5 years does any one at all get infected with hydatid in the United States or Canada, any one that is who has been born and lived all his life there.

This paper takes note of all cases which it has been possible to collect from these countries since 1808. They number 482. Where the nationality is known, 95 per cent. of all infections have been in immigrants, and 4 others probably got their infection when travelling abroad, leaving 3 persons who probably did so in Canada and 19 in the United States. Most of the infections have been in males, particularly young adults, there have been 12 only in children. The countries of origin and the cities in which diagnosis was made are given. There seems to have been no increase in the rate of infection in man since 1924, in pigs it seems there has. The normal cycle of life history is wolf to moose, or something like it, with pig and man as unusual hosts of the larva. *C. L.*

PENFOLD (W. J.), PENFOLD (H. Boyd) & PHILLIPS (Mary). **Ridding Pasture of *Taenia saginata* Ova by Grazing Cattle or Sheep.**—*Jl. Helminthology.* 1936. Sept. Vol. 14. No. 3. pp. 135–140.

A pasture contaminated with onchospheres of *Taenia saginata* became clean in course of time.

The onchospheres lying on grass get eaten by sheep or cattle, they infect cattle but not sheep; after 5 months the number of cysticerci in sites of election fell in 3 groups of clean calves from 349 in the first to 2 in the last. There are 3 possible factors in this. Groups 1 and 2 had eaten an enormous number of onchospheres as the experimental pasture had been irrigated with raw sewage to which 10 million *T. saginata* eggs had been added. Ageing lessens infectivity, for eggs kept in saline at 2°–5°C. are not viable after 16½ weeks. Meteorological conditions may have been responsible, but that is felt to be of little importance here. *C. L.*

LIU (Hsiao-Liang). **Betel Nut as a Useful Taeniafuge.**—*Chinese Med. Jl.* 1936. Sept. Vol. 50. No. 9. pp. 1273–1278.

Ten cases were treated with betel (areca) nut and 15 tapeworms came away, 2 *T. solium*, 10 *T. saginata*, 3 unnamed.

The dose is 30 gm. of powdered or thinly sliced betel nut boiled for 30 to 60 minutes in 200 cc. of soft water, to be taken on an empty stomach in the early morning. Usually the bowels are open within 3 hours, if not a saline or castor oil is given. No food to be taken for six hours after the betel nut. In the 8 cases of which there are details segments or heads were passed. In one there were two heads of *T. saginata* and 1 of *T. solium*. *C. L.*

FITTE (Oscar A.). Un caso autóctono de *Taenia solium* observado en Jujuy.—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. Mar. Vol 7. No. 3. pp. 382–385. With 2 figs.

PLAGUE.

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE, 1936 [THORNTON (E. N.), Secretary]. [**Plague** pp. 37–43.]

Epizootic plague continues to be a menace in the Union of South Africa and this applies particularly to plague among wild rodents as distinct from the domestic rodent, the rat. The fleas of these animals are not so prevalent on the rodents captured above ground as below ground. It is the nests of gerbils and water rats which "have in several instances been found to be teeming with them."

Transport of rodents by road and rail is receiving the special attention of the Department of Health. It should be the duty of farmers and storekeepers to keep their cars and lorries free from rodents. How important the road transport may come to be is exemplified by the fact that in one particular outbreak "several relatives and friends summoned by telegraph to attend . . . funerals had made the return journey . . . a total distance of 300 miles within 24 hours."

In some countries sylvatic plague, the plague of the wild rodent, does not have the importance for human beings which plague among domestic rats has. This may be the case, for instance, in the territories of Kenya, Uganda and Tanganyika. But "in the Union of South Africa and countries immediately to the north and west of it, the incidence of human plague is determined by the epizootic among wild rodents, infection being in great part direct from wild rodents and to a less extent from domestic rats infected by fleas from wild rodents." It is evident therefore that systematic watch for the signs of spread or intensification of plague among wild rodents is an essential part of a plague campaign and that "concerted action along frontiers is very desirable."

The human cases and deaths for the year were 253 and 165 respectively as compared with 290 cases with 184 deaths in the previous year. *W. F. Harvey.*

BOMBAY: REPORT OF THE HAFFKINE INSTITUTE FOR THE YEARS 1932–35 [SOKHEY (S. S.), Director]. **Part II. Research Work. A. Plague.** pp. 51–89.

This report, in its section relating to plague work, collects together important findings and experiments which have been spread over the past few years. The most important of these have reference to the measurement of virulence of the plague organisms and the estimation of immunizing values of vaccine and serum.

Previous workers have not used exact methods of test and thus there has been conflict over the use of dead or living vaccines, vaccines grown at 27°C. or at 37°C., utility of sediment or supernatant fluid of a vaccine and the use of broth or agar plague cultures.

Measurements of the quantity of plague organisms used in tests of virulence of vaccine have been done by a colony method, where the medium was a blood agar and the optimum temperature of growth was 25°C. Again, the test animal is of the highest importance, as it should be consistently and uniformly susceptible to plague. Inbred laboratory white mice over three months of age and weighing between 23 and 28 gm. are employed for this purpose. The test

of virulence is given as: "A 2 mm. loopful of the culture, of which it is desired to test the virulence, is inoculated into 10 cc. of nutrient broth and incubated for 48 hours at 25°C. 0·55 cc. of this subculture is then inoculated into 9·5 cc. of broth and incubated for 48 hours at 25°C. Suitable dilutions in saline are made from this second subculture and required dilutions are inoculated into mice . . . . A batch of five mice is used." When it is a matter of an infective test dose for the evaluation of the potency of a vaccine, the same procedure is followed. In this case a 1–100,000 dilution of the second broth subculture constitutes the standard test infective dose of 0·5 cc., which has been found to contain 60 to 120 organisms. It is given 7 days after the second portion of the immunizing test vaccine.

The maintenance of the virulence of plague cultures is a point of great importance for a laboratory engaged in the manufacture of vaccine on a large scale. Preservation of cultures at 37°C. and at 25°C. resulted in steady loss of virulence and the temperature which was found effective in this respect was one of 4°C. ± 2°C. Virulent strains are obtained as primary cultures from severe septicaemic human cases by plating venous blood on agar slopes.

The results of vaccine trials are expressed in terms of the minimum mouse protective dose, which is "the amount of a given vaccine that will protect more than half the mice immunised with a vaccine against the standard test infective dose," or 3 animals out of 5. With these methods SOKHEY has been able to show that vaccines made from cultures at 27°C. are appreciably superior in protective power to those incubated at 37°C., that heat-killed vaccine is "150 times as potent as the live avirulent vaccine made from the same strain," that even guineapigs are as easily protected against plague as are mice with heat-killed vaccines and that the supernatant fluid in HAFFKINE's vaccines is protective, while the sediment is not. He has also been able to demonstrate capsules to the plague bacilli cultivated at both 27°C. and 37°C., that virulent plague cultures can be rendered avirulent by subculturing them at 37·5°C. for about 60 to 70 weeks and that the failure of previous workers to immunize with heat-killed cultures has been due to the temperature or duration of time used for killing: he used a temperature of 55°C. for 15 minutes only.

Work on antiplague sera has perhaps not reached the same stage as that on vaccine but the results are now quantitatively measurable and tests in the field of a 2-fold or 1½-fold concentration seem promising.

Some work on a potent plague bacteriophage seemed to show that it had "little or no action in the body."

Under the heading of "rat and flea destruction" tests are described for determining the minimal quantity of a given preparation "required to kill all the rats and fleas exposed to the product in an artificial burrow of a given size." In those tests it was shown that a preparation called "calcid" with only twice the amount of hydrocyanic acid contained in "cyanogas A" was nevertheless 42 times as effective.

All these experiments are manifestly practical and of great importance for the campaign against plague infection. *W. F. H.*

CAMPBELL (A. E.). **Plague in Secunderabad, 1934–1935.**—*Jl. Roy. Army Med. Corps.* 1936. Dec. Vol. 67. No. 6. pp. 372–380.

This account of an epidemic of plague lasting from August 1934 to March 1935, in the civilian population of a military area is a graphic

tale of difficulties arising through prejudice and lack of public co-operation. The epidemic came to an end in due course and preventive measures against a recurrence have been elaborated and are given in some detail under the headings : rat campaign, by-laws, case investigation, inoculation and disinfection, and health camps. *W. F. H.*

MEYER (Karl F.). **The Sylvatic Plague Committee.**—*Amer. Jl. Public Health.* 1936. Oct. Vol. 26. No. 10. pp. 961–969.

Sylvatic plague, a term first proposed by JORGE under the name " selvatic plague," is the type of infection which occurs among wild rodents as distinct from the domestic rodents or rats. The course of epizootics of sylvatic plague is essentially independent of man's lines of communication, and is as a rule located in deserts or steppe-like countries. It spreads slowly from colony to colony of wild rodents, of which 72 species are definitely " known to suffer from spontaneous plague," and presents therefore considerable differences from a rat epizootic. Thus sylvatic plague tends to remain localized, since it is maintained in each region by a particular fauna. One principal species, " belonging as a rule to the family of sciuridae and gerbillinae living in subterranean colonies " is the pestiferous agent. Epidemicity is brought about by the contact of rodents (" varieties of muridae perhaps jaculidae ") on the one hand with the wild rodent and on the other hand with man or the domestic rodent. Each group of wild rodents has its own types of the pulicidae. " The mechanism of transmission as established by BACOT and MARTIN has been confirmed by GOLOV and JOFF for the *Ceratophyllus tesquorum* of the suslik (spermophile or ground squirrel of North-eastern Europe and North-western Asia)." Some of the fleas, it seems proved, have carried infection for 206 days and starved for nearly 196 days. Flea indices are not easy to obtain, for to get them it would be necessary to count not only the fleas captured on the animals but also those in the burrows. Other features of sylvatic plague are the occurrence of lesions in the lymph nodes without obvious symptoms of infection or even gross pathology. Primary pulmonary localization also is commoner than in rats. Location of plague among wild rodents may be difficult and a new technique has been evolved for the purpose. It is of the nature of mass inoculation and is illustrated, for example, by the collection of the fleas present on the rodents and the injection of a suspension of the insects into guineapigs. This method has proved useful in demonstrating latent or subacute plague in squirrels of various districts in California. A special committee for sylvatic plague has been formed representative of a number of States in America and this article by the Chairman of the committee is part of an attempt to make the " present day knowledge concerning plague of the wild rodents more widely available." *W. F. H.*

ROBERTS (J. Isgaer). **Plague Conditions in an Urban Area of Kenya (Nairobi Township).**—*Jl. Hygiene.* 1936. Oct. Vol. 36. No. 4. pp. 467–484. With 2 graphs.

Nairobi township, 5,452 to 5,700 feet above sea level, lies at the commencement of the Kenya highlands. Although rail and motor traffic bring cereals direct from plague-infected centres, the township " only records outbreaks at regular intervals and enjoys quite lengthy

quiescent periods." There is a general tendency to connect outbreaks with climatic conditions. It would seem that this connexion is one with heavy rainfall, which gives a cereal abundance, but which is apt to delay drying of the crop and to disorganize traffic. If at the same time low prices prevail, export quotas will be small and quantities of grain in storage increase. Add to these factors improvidence, negligence and general prodigality and an explanation is forthcoming of the rise in the rat population in highly productive years. Plague outbreaks " are associated with grain storage years."

In Nairobi *Rattus rattus* is the domestic rat. The flea species distribution on rats seems definitely to depend on the type of building and it has been found that *Xenopsylla cheopis* fleas choose *Rattus*, which nests in underground floor burrows, as their host, whereas *Xenopsylla brasiliensis* fleas choose *Rattus* living or nesting in the walls and roof, whether of wood, iron or thatch. These facts when applied to rural areas again explain why the *Rattus* of thatched roofs is infested almost entirely by *brasiliensis* and why " field rodents such as *Mastomys coucha* and *Arvicanthis abyssinicus* living underground are hosts to *Xenopsylla cheopis*." *W. F. H.*

ROBERTS (J. Isgaer). **Plague Conditions in a Rural Endemic Area of Kenya (Keruguya District, Kikuyu Province).**—*Jl. Hygiene.* 1936. Oct. Vol. 36. No. 4. pp. 485–503. With 1 fig.

Keruguya district, 4,200 to 5,200 feet above sea level, is a highly endemic plague area where not a month, during the last 10 years, has gone by without report of plague in man or rats. Food is abundant but diets are monotonous and ill-balanced, being mainly cereal with a shortage of milk and meat. Although the inhabitants are mostly prosperous, the village huts are primitive with low walls and an untrimmed thatch reaching almost to the ground.

In a rat survey of domestic premises it was found that 75 per cent. of the *Rattus* population was female and, in accordance with the general finding for rats nesting in thatch, the infesting flea was *Xenopsylla brasiliensis*. This flea seems to be equally efficient as a plague vector with *cheopis*. The rats of this highly endemic area were found to be just as susceptible to plague as the rats of non-endemic areas. Field rats come close up to native habitations and may be found even within huts or in gardens. Such field rats are *Lophuromys aquilus*, *Mastomys coucha* and *Lemniscomys massaicus*. " As there is undoubtedly an interchange of fleas between the various species of rats, it was expected that field rodents would also be found infected and that even epizootics would occur among them . . . . So far, not a single field rat has been found naturally infected with plague."

Plague in Keruguya is only of a smouldering though endemic type and does not become epidemic. Thus the generalization seems justified that " in Africa human habitations with Rattus in the roofs suffer from plague in an endemic form and habitations with Rattus underground suffer from epidemic plague." The difference here recognized does not seem to depend so much on the flea of the two types—*brasiliensis* and *cheopis* respectively—but on the greater opportunity the underground rat has of contact with man.

Another interesting point brought out is that there is " no evidence to show that there is carriage of infection from endemic centres either by rats, fleas, merchandise or man." *W. F. H.*

ROBERTS (J. Isgaer). **The Carriage of Plague.**—*Jl. Hygiene.* 1936. Oct. Vol. 36. No. 4. pp. 504–506.

A contribution is made in this article to the much debated question of the carriage of plague by man and in grain. It is summarized by the author as follows :—

" (1) Nairobi township and other areas about the Mount Kenya endemic centre have frequently been penetrated by persons suffering from plague, but, at least during the last few years, plague has failed to become established in this way. (2) A survey of rats and fleas, conducted at Mombasa upon 66 truckloads of maize in transit, resulted in no rats being seen or captured, whilst only seven fleas . . . were collected from clean white rats after they had been allowed to run about in the maize. (3) Although maize continues to be repeatedly unloaded and handled at Mombasa, this town has remained free from plague. (4) We have failed to obtain any evidence that the transport of maize from endemic centres by railway is a factor in the dissemination of plague."

W. F. H.

JOLTRAIN (Ed.). La peste à Paris (1917–1937). [**Plague in Paris 1917–1937.**]—*Bull. Acad. Méd.* 1936. Dec. 15. 100th Year. 3rd Ser. Vol. 116. No. 39. pp. 601–614.

History is better written after the lapse of time has allowed first impressions to become consolidated. This is most true of plague, whose very name is a source of alarm to nations. Plague in epidemic form had been absent from Paris since 1669. It made its appearance during the war, to assume epidemic proportions in 1920 with the record of 91 cases. In 1917 a steamer from India, containing sick rats sailed up the Seine and arrived at Levallois. Rats escaped from the vessel and the rat epizootic had thus its beginning. The first record of a human case was in an infant on 3rd December, 1917. One of the greatest difficulties encountered was a reliable method of diagnosis in ambulatory cases and in convalescents. This was found in the serum test by fixation of complement. In 1920, 120 cases were recorded and 91 confirmed. Of these 39 were untreated and had a death rate of 80 per cent. while 52 were treated and had a death rate of 6 per cent. Plague has continued in some degree since 1920, though mainly in rats, until 1935 and 1936, when the returns both for rat plague and human plague were nil.

Reference is made by the author to the possibility of a bacteriological warfare in the future. The idea of such an atrocious method of destruction of humanity is known to have been considered by some countries. Experiment has shown that plague bacilli, for example, can be incorporated in tear or asphyxiant gas without losing virulence, so that, if inhaled, they can give rise to plague pneumonia.

Some of the conclusions drawn are that, as soon as a suspicious case is notified it becomes urgently necessary to make an exact diagnosis and to begin at once, without waiting for the result, with intravenous serum therapy in doses of 100 to 200 cc. No delay should take place in making public the declaration of plague whatever the consequences may be. Commercial and social interests tend to oppose this declaration, and no wonder when it means subjection to the inflexible rules of the conventions of Venice and of Paris. Some countries may even make obligatory quarantine for plague the reason for refusal of entry of products from the contaminated country. The declaration of plague,

therefore, which should certainly be made obligatory, is not merely a medical question, it is an international one. All countries without exception ought to declare their cases. In practice, a country is afraid to set a good example lest other countries may not follow suit and so gain some advantage. *W. F. H.*

PFISTER (C. R.). 25 Jahre Pestbekämpfung in Java. [**Twenty-Five Years of Campaign against Plague in Java.**]—*Gesundheit u. Wohlfahrt.* 1936. Sept. Vol. 16. No. 9. pp. 473–476.

Twenty-five years ago plague broke out explosively in Java and found the authorities unprepared. Fortunately the medical service, with its very efficient advisers, rose to the occasion. "The plague campaign began . . . in Java on the basis of house improvement . . . and has been continuously applied in the district of Malang up to the present day. Thus it has been possible for this district, of about 740,000 inhabitants, where plague deaths during the years 1911 to 1915 amounted to 22,000, to be rendered free of plague by the improvements made to 140,000 dwellings. Since 1916, except for single imported cases, no plague has occurred here." Where epidemic plague, however, has set in, this method of house improvement is too slow and methods of vaccination have to be resorted to. The method of OTTEN, which makes use of a living vaccine, has given much better results than the previously tried method with a dead vaccine. This vaccination increases the immunity of a population for a matter of 6 months, and revaccination has then to begin. Vaccination against plague, therefore, does not deal with the really causal agent of plague, the house rat. It can, however, give the technical service time to carry out the necessary and fundamentally sound house improvement. Nowhere in the world has this type of antiplague measure, by house improvement, been so systematically carried out as in Java and nowhere have the results of vaccination been so carefully investigated. "The way in which the government of the Netherlands Indies has conducted its plague campaign is . . . absolutely unique." *W. F. H.*

ROSIER (H. J.). Verslag betreffende de pestbestrijding op Java over het jaar 1934. [**Report on the Plague Campaign in Java during 1934.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1936. Vol. 25. No. 2. pp. 109–209. With 24 graphs & 11 maps. [Refs. in footnotes.] English summary.

Reports of antiplague measures in Java are always interesting because they have a specialized character. The measures are two: one the policy of improvement of dwellings to make them rat proof, which is combined with periodic inspection, and the other, a more recent measure, of the use of a prophylactic living plague vaccine. In 1934 plague was epidemic and reached maximum proportions for any epidemic in the island. It is expected that a limit will soon be reached and plague begin to subside. During 1934 there were 23,267 cases of plague, of which 23,239 were fatal. This contrasts with similar epidemic figures of 16,969 and 16,881 respectively in 1933. No increase of the plague area took place in 1934 over 1933. The areas devastated were the same, but the intensity of the epidemic showed an increase. In

connexion with the efforts to eradicate plague it is especially interesting to note the incidence of plague in the several parts of Java. Anti-plague building measures have proceeded from east to west in the island and are not yet complete. In the present epidemic there were 2 cases of plague in east Java, 2,668 in central Java and 20,569 in west Java. Thus, practically speaking, although epidemic conditions prevailed, east Java remained free of plague.

Difficulties with the population which were previously encountered over the routine practice of spleen puncture for diagnosis *post-mortem* have been almost entirely overcome. Permission to puncture is seldom now refused and consequently secret burial of plague cases has become a rare event. Pulmonary plague was met with, and the cases recorded were 3,454 or 16·3 per cent. of the total. "However the pulmonary plague remained an incidental variation of the plague epidemic" and showed nowhere a special character.

Plague vaccination with living organisms was introduced towards the end of 1934 and it was decided in 1935 that systematic "mass vaccination of the whole population of the plague territories should be started." A preparatory trial of this method of vaccination was made in the last two months of 1934 and the results, which were observed up to May 1935, were very satisfactory. They seemed to show that "an immunity effect of about 90 per cent. of the inoculated population may be counted on." This is a very much better result than the 50 per cent. obtained in a test of the same kind in 1920–21 with the vaccines then in vogue. *W. F. H.*

DE VOGEL (W. T.). Recherches faites aux Indes Néerlandaises sur la durée pendant laquelle la puce *X. cheopis* infectée de peste peut, dans les conditions climatologiques de l'île de Java, transmettre l'infection. —*Bull. Office Internat. d'Hyg. Publique.* 1936. Aug. Vol. 28. No. 8. pp. 1525–1543. With 5 diagrams (2 folding) & 1 map.

GIRARD (G.). La peste à Madagascar Récentes acquisitions tirées des recherches effectuées au cours des trois dernières années. [**Three Years of Research on Plague in Madagascar.**]—*Ann. de Méd. et de Pharm. Colon.* 1936. Apr.–May–June. Vol. 34. No. 2. pp. 235–241.

Plague reached Antananarivo and the high plateau of Madagascar, at an elevation of 800 to 1,500 metres, in 1921. There is no reason to suppose that wild rodents play any part in its dissemination, as is the case in South Africa. Plague in Madagascar is well under control in the towns. It is in the country of the high plateau, where it makes its ravages and takes a toll of more than 2,000 victims each year. The present article deals with the researches into this problem during the last three years.

The vector flea is *X. cheopis*, which is abundant. This flea has been found by inoculation test in the guineapig to be still infective several weeks after the epizootic and in one instance for nearly three months. It is therefore not difficult to understand how plague remains endemic in Madagascar, especially as the climate of the high plateau, from the point of view of temperature and humidity, is ideal for the survival of *X. cheopis* in the dust of native huts. A new plague-transmitting flea has been discovered, *Synopsylla fonquernii*, which is found outside in rat burrows.

Notable contribution has been made from Madagascar to our knowledge of the possibility of use, the efficacy and the harmlessness of a living vaccine. It is prepared from an avirulent strain, which is called the "E.V." strain. In one district where half the population, amounting to 100,000, has been vaccinated the mortality from plague has been reduced by two-thirds and the general mortality from all causes by 50 per cent. The same avirulent living strain has also been used for the immunization of horses with a view to obtaining an anti-plague serum. These horses gradually arrive by successive inoculations at receiving two whole bottles of culture intravenously. The vaccine has to be inoculated immediately the suspension is made, in order to avoid the lysis of the germs which would set free toxin and cause a violent reaction. Titration of the horse serum furnished has shown it to be superior to the sera of the Pasteur Institute of Paris and of the Johannesburg Medical Research Institute. It has, however, not yet been sufficiently tried out in human beings. *W. F. H.*

De la Barrera (J. M.). Peste rural. [**Rural Plague.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. Mar. Vol. 7. No. 3. pp. 439–506. **With 42 figs. & 1 map.**

This study has reference to the existence of plague amongst the wild rodents of the Brazilian provinces La Pampa and Rio Negro. Human cases of plague also occurred but of very limited extent. One case was discovered in Lihuel Calel and four cases in Loventuel. The country affected is extremely sparsely populated and the wild rodents concerned make only accidental contact with man. Domestic rats were scarce in this region, which is an argument for the contraction of human plague, in the cases considered, from a species of wild rodent.

It is interesting to learn that the wild rodent, locally called "cuis" in South America, includes a number of species belonging to the genera *Cavia*, *Galea* and *Microcavia*. The species of the genus *Cavia* are the larger animals and resemble guineapigs. Many of the other wild rodents also were examined and there are good photographs of these animals and their burrows. Much work on biological lines remains to be done before the connexion between sylvatic plague, the plague of the domestic rat and human plague is cleared up. "If the domestic rat is the sole permanent reservoir of the virus its destruction should theoretically cause all plague to disappear; if, on the contrary, enzootic plague exists among the sylvatic rodents, domestic deratization alone will not solve the problem." *W. F. H.*

Uriarte (L.), Morales Villazón (N.), Crescentino (H.) & Anchezar (B.). Etapa de la peste hacia el Oeste Argentino (San Juan 1931, Los Alamces). [**Advance of Plague in West Argentine.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. July. Vol. 7. No. 4. pp. 549–567. **With 2 figs. English summary.**

An illustration of how slow the progress of plague may be is given by the case of San Juan in which plague made its first appearance in 1931, thirty years after the introduction of the disease in the eastern ports of the country. The disease was only recognized after the occurrence of 17 deaths from pulmonary plague. Investigation of the origin of the epidemic was difficult, but was ultimately traced to rats with the

presumption that these had been transported by the railway from Córdoba. The town of Córdoba had been "heavily infected with plague in previous years." *W. F. H.*

URIARTE (Leopoldo), MORALES VILLAZÓN (N.) & ANCHEZAR (Benjamin). Neumopeste en Frías, 1934. Un caso de evolución prolongada. [**Pneumonic Plague in Frias. A Case of Long Duration.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. July. Vol. 7. No. 4. pp. 705–719. With 2 figs. English summary.

The liability of influenza and plague to be for a time confused is illustrated here. In Frias, a town in the Argentine, pulmonary cases, which were diagnosed as influenza, had made their appearance. As these proved invariably fatal and were evidently highly contagious, plague pneumonia became suspected as the cause of deaths in the small village. This suspicion was confirmed bacteriologically by examination of the sputum. All of the patients, numbering 16, died with one exception in 3 or 4 days. This exception is deserving of record because of the very long duration of the illness. The patient was a young girl of 14 years whose pulmonary symptoms appeared on 10th May. "There were times when the patient showed signs of improvement but only to return to the same serious condition." Death did not take place till 10th June, a month later.

In a farm a short distance north of Frias two cases of bubonic plague occurred and these recovered. The infection of rats in this farm area was proven positive, at least 5 infected with plague out of 7 *R. rattus* and 15 *R. alexandrinus*. In Frias on the contrary the few rats examined were not infected. *W. F. H.*

URIARTE (Leopoldo). Peste, pulgas y roedores agrestes. [**Plague, Fleas and Field Rodents.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. Nov. Vol. 8. No. 1. pp. 142–158.

The discovery of the existence of extensive plague epizootics among the essentially wild rodents in different countries of the world has raised the question whether the present fundamental prophylactic antiplague measure of deratization should be modified. As the rat is a domestic rodent it stands in a different position from those wilder animals which make little contact with man. In South America the problem has arisen in connexion with the explanations put forward for some of the human plague, which has occurred there, as due to "cuis," which are generally describable as rodents of guineapig type. The author's contention is that whatever antiplague measures are adopted, they should be pursued methodically, with continuity and with vigour and should apply to the whole country. He emphasizes the fact that the efficacy of measures of deratization has been proven by long experience. It is problematical whether the same efficacy could be attained by extending those measures to the field rodent; moreover, if the field rodent is a factor of importance in the origination of epidemics, this probably occurs through contact with the domestic rodent. That is to say, the domestic rat still remains a link in the chain of causation of human plague. This really amounts to saying that the main prophylactic antiplague measure which is worth adoption by a community, even in the presence of "sylvatic" plague, is deratization.

W. F. H.

PUBLIC HEALTH REPORTS. 1936. Sept. 11. Vol. 51. No. 37. pp. 1279–1280.—**Plague found in Prairie Dogs** (*Cynomys parvidens*) **in Utah.**

Prairie dogs were first shown to be subject to plague by the demonstration of the infection in fleas taken from those animals. It is now shown for the first time " by mass inoculation of tissue material and cultures " that the disease exists in the prairie dog (*Cynomys parvidens*) in Utah. The cultures obtained gave typical reactions and the autopsy findings in inoculated guineapigs were also typical.

W. F. H.

FRICKS (L. D.). Review of Plague in Seattle (1907) and Subsequent Rat and Flea Surveys.—*Public Health Bull. No. 232.* Washington. 1936. Nov. 28 pp.

PUBLIC HEALTH REPORTS. 1936. June 26. Vol. 51. No. 26. pp. 844–845.—**Pooled-Flea Inoculations reveal Plague-Infected Areas in California.**

A method is described in this short note which might be of great use as an indication of the existence of plague infection in a district. It is the method of pooled-flea inoculation of guineapigs and was adopted originally owing to a shortage of guineapigs in the testing laboratory. Batches of fleas " sent in from the field in buffer salt solution were kept in the refrigerator for varying periods of time before inoculating them into guineapigs." These fleas had been collected from ground squirrels and in the case of three general " pools " gave rise to acute septicaemic plague in the inoculated guineapigs. One of these pools was of " 33 fleas from 104 squirrels anatomically free from plague, from 3 different regions in Madoc County and inoculated into a guineapig on June 3. Animal died of acute septicaemic plague on June 10."

W. F. H.

PUBLIC HEALTH REPORTS. 1936. Aug. 21. Vol. 51. No. 34. pp. 1159–1160.—**Plague Infection discovered in Fleas and Lice taken from Marmots in Montana and in a Marmot in Utah.**

Important points of epidemiology are involved in this short report. It is to the effect that not only fleas but also lice taken from 7 ground hogs (marmots) by the staff of the Rocky Mountain Laboratory showed plague infection, as was demonstrated by inoculation into guineapigs. " Secondary inoculations and cultures gave typical plague reactions." A sick marmot was also found : it was killed and found suffering from plague. " This is believed to be the first plague-infected marmot reported in the United States."

W. F. H.

PUBLIC HEALTH REPORTS. 1936. Oct. 16. Vol. 51. No. 42. p. 1445. —**Plague Infection in Fleas taken from Ground Squirrels in San Bernardino County, Calif.**

In 1933 a human case of plague was reported and infection was thought to have been contracted in San Bernardino County, California, and another suspicious case has occurred in the present year (1936). Search has failed to find any plague-infected rodents in the

County, but in September some fleas collected from the Californian ground-squirrel, *Citellus beecheyi fisheri*, in San Bernardino County, have given rise to typical plague in guineapigs. *H. H. S.*

PUBLIC HEALTH REPORTS. 1936. Oct. 30. Vol. 51. No. 44. p. 1505.—**Plague Infection in Fleas from Monterey County, and the Lake Tahoe Region, California.**

The use of fleas taken from wild animals, especially of pooled fleas, is becoming a useful method for the determination of sylvatic plague. In this instance fleas collected from ground squirrels (*Citellus beecheyi*) have, by injection in guineapigs, proved the existence of plague in Monterey County. "A human case of plague was reported from Monterey County in June of this year." Again "pooled fleas taken from chipmunks (genus *Eutamias*) and ground squirrels (*Citellus beecheyi* and genus *Callospermophilus*) in the Lake Tahoe region" have proved, on inoculation, the existence of plague there.

W. F. H.

WU (C. Y.). **Rats and Rat-Fleas of Shanghai.**—*Reports National Quarantine Service Ser. VI.—1935–6.* pp. 31–41. With 8 figs. on 2 plates.

Shanghai is situated on latitude 32°N. and has a climate which is cold and damp in winter, mild and wet in spring, very hot and humid in summer, and cool and dry in autumn. "The rat population is predominantly *R. rattus* (85·5 per cent.)." Of the rat fleas caught *Leptopsylla musculi*, "the mouse flea" is relatively harmless, formed 76 per cent. of the total, and is present throughout the year. Next in frequency comes *Ceratophyllus anisus* at 17·6 per cent.; it is a spring flea. The chief vector flea, *X. cheopis*, formed only 6 per cent. of the fleas collected and was obtained only in the autumn months. "*Ceratophyllus fasciatus* is practically absent in Shanghai." Emphasis is laid on the fact that "*X. cheopis* is not a common species in Shanghai and has a definite seasonal incidence" . . ."The conclusion is arrived at that plague has never gained a firm foothold in this city nor is it likely to do so unless conditions to the north and south are radically altered or factors other than the seasonal prevalence of *X. cheopis* come into play in the future." *W. F. H.*

BONEBAKKER (A.). Bijdrage tot de cliniek der pest. [**The Clinical Features of Plague.**]—*Geneesk. Tijdschr. v. Nederl. Indië.* 1936. July 28. Vol. 76. No. 30. pp. 1890–1902.

Most of this article has as its theme the question whether there is any real difference between bubonic plague and plague septicaemia. The use of early blood culture and a bile medium has served to show that there is no great difference. According to the author's own summary he found as follows:—

"By observations on 250 plague patients in whom blood-bile cultures were carried out both in bubonic and septicaemic plague it appeared that:—(1) Already at an early stage of bubonic plague bacilli are present in the blood in 85 per cent. of cases. (2) In the course of bubonic plague, and indeed also in septicaemic plague, secondary buboes can appear as a result of haematogenous infection. (3) Cases of pure bubonic plague without

septicaemia are relatively rare and have a good prognosis. (4) By contact with sufferers from pneumonic plague individuals may contract either bubonic or septicaemic plague without a primary lung lesion."

W. F. H.

PUBLIC HEALTH REPORTS. 1936. Aug. 7. Vol. 51. No. 32. p. 1091. —**An Unusual Case of Bubonic Plague.**

The mildness of the case of pestis minor here reported is the reason for its publication. An 11-year-old boy while cleaning a bush rabbit cut his thumb on a bone. No local infection developed, but 3 days later pain was felt in the axilla. On the 4th day the patient had headache, the pain was worse and he was admitted to hospital with temperature 104°F., prostration and an axillary bubo. Smears from the bubo apparently showed bipolar organisms and blood was inoculated into guineapigs. In a week the patient showed improvement and the temperature was normal in 10 days. The guineapig inoculated with blood a week previously died, " and smears from organs showed many typical bipolar organisms." *W. F. H.*

KOROBKOVA (E.). A la biologie de *Pasteurella pestis.* [**Biology of** *Pasteurella pestis.*]—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 2. [In Russian pp. 163–184. With 7 figs. [23 refs.] French summary pp. 184–186.]

Out of 32 plague strains inoculated by stab culture in agar and kept at 11° to 28°C., 16 were found to have preserved their full vitality after 12 years. They fermented glucose, mannite, maltose and glycerin, but not lactose nor saccharose. Four of the strains fermented rhamnose just as well as *Past. pseudotuberculosis rodentium.* All the strains were agglutinated by specific serum and lysed by plague bacteriophage. Seven of the 16 strains had kept their virulence, while the rest were avirulent. In the case of *Past. pestis* it is the R strain, and not the S, which is virulent, and as R strains are very stable there is little tendency to dissociate to an S strain. One of the strains however did show dissociation into R and S forms. These S forms had smooth, transparent, viscous colonies with regular margin, gave secondary colonies, uniform turbidity in bouillon, and frequently showed a capsule. All their biochemical, agglutinating and phage properties were identical with those of the R type. The S type showed a tendency to revert to the R type. *W. F. H.*

URIARTE (Leopoldo) & MORALES VILLAZÓN (N.). Conservación de la vitalidad y virulencia del *B. pestis.* [**Preservation of the Vitality and Virulence of the Plague Bacillus.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. Nov. Vol. 8. No. 1. pp. 5–12. With 1 fig. English summary.

The spleen of two rats which were in a state of advanced decomposition furnished living plague bacilli after 6 days. Films from the spleen only showed putrefactive organisms, but intraperitoneal and subcutaneous inoculation in guineapigs caused death of these animals from plague. The spleen of plague-infected animals could be preserved for 12 to 19 days in a 20 per cent. neutral glycerine containing 2 per cent. calcium carbonate. In the bone marrow of experimentally

infected animals the bacillus remains alive for 12 days, and longer still if naturally infected. The original virulence of a strain of the plague bacillus may be preserved for more than two years in a phosphoric anhydride vacuum tube. *W. F. H.*

DONSKOW (G. D.) & LOCHOW (M. G.). Ueber den Einfluss von Alkohol auf die morphologischen, biochemischen und biologischen Eigenschaften des *B. pestis*. [**Effect of Alcohol on the Plague Bacillus.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 2. [In Russian pp. 187–193. German summary pp. 193–194.]

No growth of plague took place in a bouillon to which 20 per cent. alcohol had been added. At less concentration the transference of bacilli from bouillon to ordinary media showed retardation of growth but no change in morphological and biochemical properties. A virulent strain of plague, however, exposed to the action of 10 per cent. alcohol for 30 days or 15 per cent. alcohol for 3 days was found to have lost its virulence and this virulence was not restored by subpassage in the mouse. *W. F. H.*

BESSONOVA (A.). **A Method for the Cultivation of Transitional-Rough (OR) Variants of** *B. pestis*.—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 2. [In Russian pp. 195–197. With 2 plates. English summary pp. 197–198.]

These transitional rough variants of the *Past. pestis* were obtained by sowing minimal quantities on blood or haemolysed blood agar.

W. F. H.

BESSONOVA (A.), LENSKAYA (G.), MOLODTZOVA (P.) & MOSSOLOVA (O.). **Some Cases of Spontaneous Transmutation of** *B. pestis* **into** *B. pseudotuberculosis rodentium* **Pfeiffer.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 2. [In Russian pp. 151–162. [35 refs.] English summary p. 162.]

The close relationship of and the possibility of confusion between *Past. pestis* and *Past. pseudotuberculosis rodentium* have often been described. In this communication the authors maintain that they have observed the transmutation of four human strains of the plague bacillus and one ground-squirrel strain into *Past. pseudotuberculosis rodentium*. The proofs of this transmutation are afforded by means of simultaneous tests of each of the transmuted strains and known control strains as to: (1) their ability to show growth on agar in 24 hours, (2) their ability to give any growth at all with sowing of minimal quantities, (3) their fermentation of rhamnose, and (4) the type of the respective growths on various differential media.

W. F. H.

MITIN (S. V.). Immunological Studies on Plague. V. Preparation of the Plague Vaccines A–D by Silber's Method.—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 2. [In Russian pp. 199–208. With 4 figs. English summary p. 208.]

DOPMEYER (A. L.). **Plague Eradicative Measures on the Island of Maui, Territory of Hawaii.**—*Public Health Rep.* 1936. Nov. 6. Vol. 51. No. 45. pp. 1533–1556. With 3 folding maps, 3 figs. & 4 plates.

The measures adopted in the island of Maui have essentially been those of an anti-rat campaign. Poisoning and trapping have been used. The areas cleared of rats have been chiefly field and gulch areas, which have had the brush harbourage of the rats removed by the work of labourers. Rats caught are examined macroscopically and any that are suspected of plague are examined microscopically. Mass inoculation methods are also used and the "material from not more than 10 rats is used for inoculating" a guineapig or white rat. The population of Maui is 52,000: the cost of the campaign in 1935 was approximately 122,000 dollars of which approximately 93 per cent. "was spent for labor and salaries." *W. F. H.*

MOORE (Roy). **Rodent Control in Food Establishments.**—*Amer. Jl. Public Health.* 1937. Jan. Vol. 27. No. 1. pp. 62–66.

Red squill is a rat poison which is comparatively harmless to human beings and domestic animals. If eaten at all by the latter, it will be vomited. The aim should be in poisoning to kill all rats with one application, otherwise surviving rats become suspicious and refuse the baits. Thus it is essential to lay down abundance of baits and not to undertake poisoning operations more than two or three times a year. It is advisable to get rid, for a few days, of all the food that is available to rats in an establishment before putting out poison baits. The formulae "commonly used in the rat poisoning campaign of the Biological Survey" are:—(*a*) meat bait—powdered red squill of high toxicity 1; ground fresh beef uncooked 15; corn meal 1, and (*b*) cereal bait—powdered red squill of high toxicity 1; rolled oats of good quality 11; corn meal 1. A little water should be stirred in to make a rather moist dough. *W. F. H.*

HOLSENDORF (B. E.). Rat Harborage and Ratproofing.—*Public Health Rep.* 1937. Jan. 15. Vol. 52. No. 3. pp. 75–81.

ALLARD (Maurice). Dératisation d'une vieille ville coloniale (Saint-Louis-du-Sénégal).—*Ann. d'Hyg. Pub., Indust. et Sociale.* 1936. Sept. Vol. 14. No. 9. pp. 525–553. With 10 figs.

JENSEN (Gregers). Et tilfaelde af ratininfektion. [**A Case of Ratin Infection.**]—*Hospitalstidende.* 1936. Sept. 22. Vol. 79. No. 38, (Med. Selsk. f. Fyens Stifts Forh.) pp. 73–75.

On January 1st, 1936, a Danish householder put some crusts of bread, treated with ratin, into an unlocked cupboard in the evening. Next day some of the crusts were missing, and in the evening a hitherto perfectly well boy of 16 months suddenly fell ill with violent abdominal pain and diarrhoea. The clinical picture was that of acute enteritis of a paratyphoid type, but a bacteriological examination of the stools revealed a pure culture of Gärtner bacilli of the ratin type. They behaved in every respect as did the bacilli cultivated from the bread which had been treated with ratin. By January 17th all pathogenic intestinal bacteria had vanished, but Gärtner bacilli of the ratin type

were agglutinated in a dilution of 1 in 800. Typhoid, paratyphoid and Bang's bacilli were not agglutinated. The child was very ill for a couple of days, but had recovered completely after six days.

Ratin can be bought of Danish chemists, the preparation being "authorised," and its sponsors being in touch with the State Serum Institute in Copenhagen. Only one strain is used, the so-called arabinose-positive Gärtner bacillus. In 1931, Martin KRISTENSEN and Knud BOJLÉN of the State Serum Institute published a study of ratin infections in human beings, giving an account of ten outbreaks of acute gastro-enteritis in which the stools yielded Gärtner bacilli of the ratin type. In one case the infection terminated fatally. On the same occasion, FLY recorded the case of a would-be suicide, aged 28, who swallowed a 170-gram bottle of ratin. The violent, febrile gastro-enteritis, which developed in the course of about 10 hours, ended in recovery after about a week. Since then, 17 new cases have been observed in Denmark, and the vendors of ratin have several times changed the instructions concerning its use. They now recommend its handling only by their own employees, if possible. Some 50,000 deposits are made by them every year in Denmark.

C. Lillingston.

THIERFELDER (M. U.). De organisatie van de vaccinatie tegen pest met levend vaccin volgens Otten. [**The Organization of Anti-plague Vaccination with Otten's Living Vaccine.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Sept. 15. Vol. 76. No. 37. pp. 2325–2338.

An immunity of 90 per cent. is claimed for living plague vaccine: that is to say, for every 100 deaths among the non-vaccinated there should be only 10 deaths among the vaccinated. It would have been desirable to test statistically the duration of the immunity conferred, but, with a success of the order claimed, it was clearly not justifiable to withhold protective vaccination from a population which was at risk. Many difficulties arise, if this type of vaccination is to be carried out on a large scale. The vaccine itself is a living vaccine, has to be very carefully prepared and cannot, because it is living, be stored for too long a time. It could not, moreover, be made in indefinitely large quantities. Then, too, the arrangements for any large scale inoculation must not be too disturbing to the life and work of the people concerned. Two dilutions of the vaccine were used, one of 1·5 agar culture per cc. in adults and one of 1·10 agar culture for children under 12 years. The dose was 1 cc. Abscess formation, although not unknown, occurred only to the extent of about 80 cases per 1,000,000 inoculated. Another very important arrangement, which reduced greatly the speed of inoculation and the numbers which could be dealt with daily, was the need for exact registration of those vaccinated. These and other difficulties were surmounted and it was possible, in the selected regencies of Bandoeng and Soemedang, to inoculate 1,049,533 persons of their own free will out of a total of 1,149,273, or 91·3 per cent. There were few contra-indications to vaccination. Exceptions were:—children under 3 months, persons with extensive skin disease or with fever and those who were seriously sick or debilitated. Pregnancy, except in the last month, was not a contra-indication.

The question of revaccination arose and, as no exact facts were available as to the duration of immunity, it was decided to carry out

this procedure for each native village or dessa according to the occurrence weekly of a given number of plague deaths. Especial notice was taken of whether cases were of bubonic or pulmonary type. All the preparations for revaccination were practically identical with those of the primary vaccination. *W. F. H.*

OTTEN (L.). **Immunization against Plague with Live Vaccine.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 73–101. With 1 graph. [42 refs.]

Otten's work with dead and live plague vaccine has attracted much attention because it deals with the very fundamental question of the best and safest method of immunization of human beings. It has been already considered (this *Bulletin* 1934, Vol. 31, p. 35 and 1936, Vol. 33, pp. 364–365). His conclusions in this article set out the present position for the live vaccine. They are that: (1) Experiments on wild rats and guineapigs with the live, attenuated strain "Tijwidej" gave results much superior to those which have been obtained with dead vaccine. (2) Investigation of a number of strains, 5 to 15 years old and preserved in stab culture at 5°C., yielded avirulent variants even when the parent cultures still remained virulent. (3) This loss of virulence was not correlated with age of the culture nor could it be said to belong to any special alteration in the form of colonies. (4) Avirulent variants might show great differences in antigenic potency, as was proved by animal test; some had high immunizing value and some almost none. (5) Immunizing properties are dependent on more than one antigen. Two of these could be demonstrated by animal experiments; one produced the highest degree of immunity in rats, the other in guineapigs. (6) By tests in the field with application of an alternate case method it appeared that mortality from the bubonic form of plague in man can be reduced to 1/10th. (7) A mixed vaccine containing the strains which have special efficacy in rats and in guineapigs respectively might have even better results. (8) What applies to these avirulent variants of the plague bacillus may apply to other organisms, which are used as vaccines. *W. F. H.*

URIARTE (Leopoldo) & MORALES VILLAZÓN (N.). Sensibilidad e insensibilidad a la peste de algunos animales. [**Susceptibility and Non-Susceptibility to Plague of Some Animals.**]—*Rev. Inst., Bacteriológ.* Buenos Aires. 1936. July. Vol. 7. No. 4. pp. 720–726. English summary.

Two rodents *Graomys griseoflavus griseoflavus* and *Lagostamus maximus immolis* proved very susceptible to plague. Another wild animal the "peludo" (*Chaetaphractus villosus*), a species of armadillo, was practically insensible to plague in large doses, even intraperitoneal.

W. F. H.

BHARGAVA (R. C.). Notes on Plague.—*Jl. Indian Med. Assoc.* 1936. Sept. Vol. 5. No. 12. pp. 736–742. [59 refs.]

CHOLERA.

PANDIT (C. G.), RICE (E. Milford) & NEAL (W. J. L.). **A Statistical and Bacteriological Analysis of a Cholera Epidemic in Manipur State, Assam.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 37–64. With 1 map & 1 graph.

Considerable care has been taken in the analysis of this cholera epidemic to take into account all the usual statistical characters which affect the final presentation of data. The epidemic affected a population "which is homogeneous from the standpoint of caste and customs." In the analysis of the data due note is taken, in the three groups, (*a*) no treatment, (*b*) bacteriophage treatment, and (*c*) essential oil treatment, of (1) age and sex distribution, (2) the possibility of inclusion of all fulminating cases in the no treatment group, (3) psychological factors likely to operate with any form of treatment as against no treatment, (4) the preference of the population for any one form of treatment, (5) the significance of the results obtained at the time when treatment and no treatment were all in use together, and (6) the possibility that the total case incidence was not really representative of the area involved by reason of "missed cases" in the untreated group. If we take the results obtained at a time when both essential oils and bacteriophage were being used and compare them with the untreated group of the same period we find that the mortalities were 87·1, 36·4 and 37·1 per cent. for no treatment, bacteriophage and essential oil treatment respectively.

A bacteriological investigation showed that the strain of vibrio isolated in the epidemic was typically agglutinating and that variations in agglutinability became noticeable towards the end of the epidemic.

W. F. Harvey.

PANDIT (C. G.) & RICE (E. Milford). **An Epidemic of Cholera in Mondair Village (Habiganj Subdivision, Assam).**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 65–71. With 1 map & 1 graph.

The epidemic broke out in Mondair village with a population of 751 and resulted in 65 attacks with 33 deaths. A sufficient stock of bacteriophage was available in the village for the treatment of early cases. It is in some ways unfortunate that no really statistical comparison can be made in this case between treated and untreated owing to the small numbers of the untreated and to the fact that many of those receiving bacteriophage suffered from diarrhoea but were not recorded as cholera cases although they were subsequently proved to be such by agglutination tests. The figures were, 55 cases treated by bacteriophage with 27 deaths and 7 untreated with 3 deaths. Some cases are omitted for good reasons.

The authors finally say that "in view of these findings it would be premature to say in the present state of our knowledge, that bacteriophage had absolutely no effect in altering the character of the epidemic in some ways."

W. F. H.

BOZMAN (C. A.) & LEWIS (E. G.). **An Enquiry into an Outbreak of Cholera in Burma with Special Reference to the Value of Preventive Inoculation.**—*Indian Med. Gaz.* 1936. Nov. Vol. 71. No. 11. pp. 647–651.

Mass preventive inoculation with anticholera vaccine in a dose of 1 cc. was used. Many tables of figures are given and a statistical test applied to these, " shows that in no table where the expected frequencies are sufficiently large can inoculation be said not to be positively associated with exemption from attack " . . . " It must be pointed out, however, that before a reliable estimate can be made of the degree of protection afforded, by a measure such as preventive inoculation, it is necessary that fuller particulars of the population at risk should be available so that the homogeneity of the material may be investigated."

W. F. H.

BERNARD (Noël). Le choléra dans les colonies françaises. [**Cholera in the French Colonies.**]—*Ann. de Méd. et de Pharm. Colon.* 1936. April–May–June. Vol. 34. No. 2. pp. 177–215.

The author insists on the commonly held view that cholera has had its permanent and primary home in British India for 25 centuries, according to the most ancient authorities. It spreads east and west from this focus. Europe has developed measures which have effectively put an end to the pandemic spread of cholera and so has Japan. French Indo-China, owing to its extensive land and sea frontiers has found it impossible to prevent the advent of cholera within its borders, where the history of each invasion has been—one year of importation of infective germs, a period of several years in which many foci make their appearance, and a period of disappearance. The extension of infection is ascribed to interhuman contact and to transportation by water and flies. This menace of cholera is avoidable and must be met by notification, isolation, disinfection, sanitary inspection, education of the public, general hygiene and preventive medicine. Prevention is best attained by the provision of a good water supply and by vaccination. *W. F. H.*

DOORENBOS (W.). Le choléra. Conceptions nouvelles sur les principes fondamentaux de l'épidémiologie et de la prophylaxie du choléra. [**Cholera. New Conceptions. Epidemiology and Prophylaxis.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1936. Oct., Nov. & Dec. Vol. 58. Nos. 8, 9 & 10. pp. 595–617 ; 675–697 ; 736–757, & 1937. Jan. & Feb. Vol. 59. Nos. 1 & 2. pp. 22–50 ; 105–121. With 5 figs. [69 refs.]

In this series of articles we have an analysis of factors relating to the epidemiology and pathology of cholera as an infectious disease, as well as of certain phenomena designated by the author equilibrium and dysequilibrium of vibrio characters. This question of equilibrium in an epidemiogenic sense turns on the thesis of a critical virulence for every virus and on the susceptibility of the individual attacked. The transmissibility of a disease is correlated with organismal virulence or power to multiply and the gravity of symptoms with toxigenic power. These factors may be entirely independent. Disproportionate development of one may lead to actual diminution of the other—to dysequilibrium and to development of an " incomplete " virus. An important conception in this theory is that of the " microbe of sortie,"

stimulated into activity by other species of microbes. It is thus that proteus, enterococcus, colon and dysentery organisms may become the mobilizing factor in the appearance of latent cholera. It may be necessary in the prophylaxis of cholera to combat, not only the specific virus but the non-specific factors favourable to its regeneration.

For half a century bacteriologists have been arguing over what is the true cholera vibrio: all attempts to define it appear to have failed. This is largely due to the continuous record of atypical vibrios, vibrios which may be too long, too short, not sufficiently agglutinable, haemolytic and so on. "It becomes more and more evident that the atypical vibrios are none other than modified cholera vibrios . . . The word atypical is not exactly suitable. Atypical vibrios can under certain conditions become typical." Nor is the term atypical applicable to the cholera organism only. It applies also to the clinical condition and to the epidemiology of cholera. "It is, for example, impossible to recognize clinically a premonitory diarrhoea, or even a slight case of cholera." Epidemiologically it is found that in the earliest manifestations of cholera, when they are only suspect, the medical authorities tend to have resort to fantastic explanation of the occurrence: paracholera, pseudocholera, gastroenteritis or even ptomaine poisoning. This then is the reason why "true cholera always precedes official cholera." There are exceptions to this train of events. Thus in 1930 the pilgrimage to Tor was declared affected with latent cholera "because the laboratory had found an agglutinable vibrio among the pilgrims, although no indication of clinical cholera was manifest."

The so-called peculiar attributes of the "true cholera vibrio," naturally, receive special attention. But these have undergone continuous change in the direction of greater and greater specific characterization. The order and nature of the change may be given as:—(1) appearance of the cultures on gelatin and production of indole; (2) production of indole and virulence for the guineapig; (3) agglutinability and Pfeiffer's phenomenon; (4) serological reaction and haemolytic power. A cholera vibrio, in order to be truly official, must now be specifically agglutinable and non-haemolytic. Nonconformity with these specifications in vibrios, found to be actually cholerigenic, has led to the introduction of a hypothetical disease called "paracholera." A chemical turn to the characterization of the true cholera vibrio has also been introduced by regarding the true group as possessed of a certain protein and a certain polysaccharide, but the fact that vibrios can change their chemical composition and pass into another group shatters this particular conception of specificity. A "complete" cholera vibrio, according to the author possesses three characters: (1) agglutinogenic power, (2) power of absorption of agglutinins and (3) agglutinability. "Incomplete" vibrios do not possess all these characters.

Antigenic structure, naturally, in view of the intensive work which has been done on the cholera vibrio comes in for consideration. Now, the cholera vibrio has only one flagellum. It might be expected therefore that the H, or flagellar, or thermolabile antigen would be deficient. It has been shown that, although labile by comparison with the O antigen, the H antigen can withstand heating at 60°C., so that sera prepared with suspensions killed at this temperature contain both O and H agglutinins. Contrary to what obtains among salmonella organisms the cholera H antigen is non-specific and the

O antigen is specific. Unfortunately, heating suspensions of cholera vibrios at 100°C. for 2 hours, while it destroys the H antigen and leaves the O antigen, brings out another O antigen which is non-specific. But this is not all, for serological tests have established that three different types of cholera vibrio exist, each possessing the specific O antigen, but also another O antigen specific to itself alone. This division into three types has long been maintained by Japanese workers. A remarkably high degree of specificity in testing cholera vibrios is obtainable by using living organisms in normal salt solution, performing the agglutination test at 37°C., exacting rapid and complete agglutination and using sera of relatively low titre. Researches in this direction have demonstrated the identity, at least in antigenic structure, of the El Tor vibrio and the cholera vibrio. Still more recent research, the basis of which has been the prolonged action of chloroform on the cholera vibrio, appears to show that O agglutinability diminishes and H agglutinability increases with this treatment. These observations go to prove that " the antigenic difference between agglutinable and non-agglutinable vibrios is not as great as one was inclined to maintain. In fact there is no impassable gulf fixed between these two classes of vibrios, which can be transformed the one into the other in the course of an epidemic . . . There is, if we carry the serological test to its limit, not one single vibrio which is identical with any other." May we not conclude then that " there is an error in our conceptions of the absolute value of serological characters invented for the identification of the true cholera vibrio ? " These observations lead to the conclusion, largely based on the examinations conducted at Tor, that : (1) If a vibrio is to be cholerigenic it must be agglutinable. (2) The clinical syndrome of cholera can be provoked both by agglutinable and non-agglutinable vibrios, but only agglutinable vibrios give rise to transmissible cholera.

In the 3rd chapter of this memoir the author treats thoroughly of the El Tor vibrio. It is the vibrio type which is most concerned with the problem of the cholera of the Hedjaz and its transport into Egypt. In this chapter likewise there is brought out what is the author's conception of the epidemiology of cholera. The idea that there is but one true cholera vibrio " is quite insufficient to explain the different clinical and epidemic manifestations of the disease . . . Epidemic carriers can sow the seeds of disease in intermediate countries by deposit of the 'incomplete' specific virus. These intermediate countries between India and Europe are situated in the near East ; the Hedjaz and Iraq can function as 'relays' of cholera. Then Turkey and the Balkans are endangered and from these again Egypt and Europe may be contaminated . . . The observations related prove the fact, which is generally accepted, that the danger of propagation and outbreak of cholera resides primarily in sick individuals, among whom there may be unrecognized cases of cholera."

W. F. H.

TAYLOR (J.). Recherches sur le choléra dans l'Inde. [**Cholera Research in India.**]—*Bull. Office Internat. d'Hyg. Publique.* 1936. Oct. Vol. 28. No. 10. pp. 1905–1908.

In these important cholera researches which are being carried on in India it has been recognized that it is absolutely necessary to work on a uniform basis, especially in serology and to have personal contact

among the workers. The O antigens are made the subject of special study and that requires pure O sera. As antigens, certified desiccated Inaba and Ogawa strains, the Japanese " original " and " variant," were obtained and sera made to these. Up to the present no vibrio strains of the type Ogawa have been isolated in India. During inter-epidemic periods in Bengal many strains isolated from cases of clinical cholera were non-agglutinating and were tested. It was found that while some of these strains belonged to the O groups 2 to 6 of GARDNER and VENKATRAMAN, most of them were of another type. Moreover, vibrios belonging to these latter serological groups, other than the group O, were also isolated from healthy carriers and from external sources.

It is important for those engaged in the manufacture of cholera vaccine on a large scale, and perhaps still more for the authorities who wish to have a supply in readiness for emergency, to learn that good evidence now points to its retention of potency for at least a year instead of the 6 months which has been allowed hitherto.

W. F. H.

LINTON (Richard W.), MITRA (B. N.) & MULLICK (D. N.). **A Study of the Metabolism of Two Hundred and Ten Vibrio Strains.**—*Indian Jl. Med. Res.* 1936. Oct. Vol. 24. No. 2. pp. 317–321.

Previous work by the authors (this *Bulletin*, 1936, Vol. 33, p. 375) had shown the existence of a relation between the chemical groups of the vibrios and their metabolic activity. The present study is an extension of that work and has special reference to rate of respiration and the presence or absence of aerobic glycolysis. A great range of vibrio strains was used, from cases of cholera, contacts, carriers and the water of tanks. Case and contact vibrios were found to come within the range of metabolic activity characteristic of groups I and VI : carrier strains within that of groups IV and V, while tank water vibrios occupied group III. It is to be emphasized that " ranges widened with the greater number of strains studied " so that the several groups could not be differentiated by metabolic activity alone : these groups, however, can be " readily differentiated by chemical analysis." " It is highly probable that these correlations between source, chemical structure, function in the cholera problem, and metabolism are real . . . . On this basis, case and contact vibrios possess protein I, carrier and water vibrios protein II." *W. F. H.*

LINTON (Richard W.) & MITRA (B. N.). **Vibrio Polysaccharides.**—*Indian Jl. Med. Res.* 1936. Oct. Vol. 24. No. 2. pp. 323–330. [12 refs.]

The authors summarize their work " on the separation of sugars by yeast fermentation, on the identification of polysaccharides in peptone water cultures and on the acetyl polysaccharides of the vibrios." The methods used by them are given in some detail and special attention is paid to the possibility that some constituent of the nutrient agar was contaminating the vibrio polysaccharides. This possibility was, however, excluded. " It is shown that all three types of vibrio polysaccharide exist in the cell as acetyl compounds . . . The acetyl and deacetyl forms of each polysaccharide type differ in

their specific rotations from each other and from the two forms in the other types. All appear to be nitrogen-containing sugars, with about 3 per cent. of N and about 0·6 per cent. of amino N." *W. F. H.*

POLLITZER (R.). **Further Observations on Cholera-like Vibrios.**—*Reports National Quarantine Service Ser. VI.—1935–6.* pp. 70–81. With 2 graphs.

As regards seasonal incidence of water vibrios the conclusion is drawn that too much stress should " not be laid upon slight differences in the incidence of water vibrios during the winter months " and that " probably the incidence of these vibrios during the warm season might be of value in forecasting the appearance of cholera."

A special study was made of an unselected series of 100 water vibrio strains with reference to the two blood reactions, haemodigestion and haemolysis, and the reactions of HEIBERG with the 3 sugars saccharose, arabinose and mannose. It is noted that " Heiberg's material appears to have consisted of non-agglutinable vibrios isolated from human stools rather than of water vibrios." In the present research no significant relationship could be made out between the blood reactions of the water vibrios tested and the reactions with HEIBERG's three sugars. It is especially noteworthy that the large proportion of 32 per cent. of the Shanghai *water* vibrios belonged to HEIBERG's group I, which is of the true cholera group. A comparison of these 32 vibrios, belonging to HEIBERG's group I as regards their blood reactions, and their ability to curdle milk places 5 strains near to the cholera group—of no haemodigestion, no haemolysis and late or no curdling of milk—and 6 in the El Tor group, in which vibrios are positively haemolytic, do not digest blood and may show curdling of milk in 3–7 days or not at all.

In the case of examination of stool samples from out-stations it was found best to have these samples inoculated on the spot into peptone water of pH 8 and then transmitted by post. It is noted that quite a large proportion of *Bact. morgani No. 1* was isolated from these samples, but that the 3 actual vibrios isolated were not agglutinable by an anti-cholera serum. *W. F. H.*

WHITE (P. Bruce). **Lysogenic Strains of *V. cholerae* and the Influence of Lysozyme on Cholera Phage Activity.**—*Jl. Path. & Bact.* 1937. Jan. Vol. 44. No. 1. pp. 276–278.

Much of this work has reference to cholera phage £, a recently isolated phage, said to be probably rare and of low lytic power. The strain now available has been renamed phage ££ (££φ) as it differs in certain important respects from the originally described and now lost £φ. The activity of ££φ " has been found limited to certain strains of *V. cholerae* and has as a rule been feeble." It tends to become progressively more feeble by passage in peptone water cultures, but " it has been found that egg-white lysozyme (egg-white used in 1 : 25 concentration), itself without appreciable effect on the growth of the normal cholera vibrio, so enhances the activity of ££φ that visibly active filtrates may be obtained with regularity." Experiments with egg white showed that ££-resistant strains of " agglutinable " cholera vibrios appear to be invariably lysogenic and are infected with ££φ. This new cholera phage ££, instead of being rare, is probably the most

frequently occurring of Indian cholera phages. It is probable that it is a new and hitherto unrecognized entity and that " all the cholera phage type filtrates in currency are contaminated with *ℓℓφ*: many certainly are." It was, however, found that Chinese and Japanese strains of *V. cholerae* were *ℓℓ*-free and *ℓℓ*-sensitive but that, once exposed to this phage action, " they became like the Indian strains inveterately lysogenic." A series of typical El Tor strains, on the other hand, " and a number of non-cholera vibrios were found to be neither infected with nor susceptible to *ℓℓφ*."

Although the *ℓℓ* phage gave no visible evidence of action on rough *ℓℓ*-free races of *V. cholerae*, it was found to multiply indefinitely on R cultures " which, like those of the S form, became lysogenic."

" Cholera phage *ℓℓ* is fixed and inactivated by the polysaccharides of S, R and ρ *V. cholerae* and probably has a specific affinity for the substance" named Cγ (WHITE, this *Bulletin*, 1936, Vol. 33, 861). Where no specific polysaccharide affinity existed lysozyme did not enhance bacteriophage activity.

One further point is raised with respect to *ℓℓ* phages. It is that the least active strain is capable of immediately rendering an originally sensitive vibrio resistant in perpetuity to the most active. The explanation given of this phenomenon is that the less lytic phage establishes itself on the " phage receptors " of the sensitive vibrio and thus blockades it to the action of the more destructive strain. The term " blockade immunity " is suggested for this phenomenon.

W. F. H.

COMBIESCO-POPESCO (Cornelia) & COCIOBA (Ion). Sur les propriétés fermentatives des vibrions. [**Fermentations of the Vibrios.**]—*C. R. Soc. Biol.* 1937. Vol. 124. No. 2. pp. 151–153.

Altogether 107 strains of vibrios were studied for their action on glucose, maltose, mannite, saccharose, dulcite, mannose and arabinose after determination of their agglutinability to antiserum of a vibrio of group I " O " [GARDNER and VENKATRAMAN (this *Bulletin*, 1935, Vol. 32, p. 769)]. The results obtained were :—(1) all agglutinable vibrios from cases of cholera belonged to group I of Heiberg (this *Bulletin*, 1934, Vol. 31, p. 898)—59. (2) Of the non-agglutinable vibrios, those derived from definite cases of cholera, were distributed between Heiberg's groups I and II—15 ; (3) none of the paravibrios fermented any of the three sugars, mannose, arabinose or saccharose and belonged therefore to Heiberg's group VI—7 ; (4) El Tor vibrios isolated in 1930 and not agglutinable by serum I " O " were placed in Heiberg's groups I, II, III, IV.

A classification based on the fermentation of the 5 sugars, glucose, maltose, mannite, saccharose and dulcite is not practical because it does not allow of differentiation between agglutinable and non-agglutinable strains. *W. F. H.*

TAYLOR (J.), READ (W. D. B.) & PANDIT (S. R.). **Fermentation Reaction of Vibrios.**—*Indian Jl. Med. Res.* 1936. Oct. Vol. 24. No. 2. pp. 349–356.

An examination is made by the authors into the relative merits of serum and chemical methods for differentiation of cholera vibrios. The chemical methods are those especially advocated by HEIBERG

(see above). In the summary it is stated that :—(1) "Heiberg's finding that vibrios agglutinable with cholera high titre serum of type 'O' group I always produce acid from mannose and saccharose and not from arabinose has been confirmed . . . . (2) The same reactions were given by 26·8 per cent. of inagglutinable vibrios isolated from human sources including cases and carriers and by 11·4 per cent. of vibrios isolated from water. (3) It is concluded that the fermentation tests with these three sugars will not provide the accurate information as to the characters of vibrios which can be obtained by serological tests." *W. F. H.*

GROSSMANN (H.). Ueber den pH-Verlauf bei der Vergärung von Kohlehydraten (Alkoholen) durch Cholera- und El Tor-Vibrionen. (Beitrag zur Frage der Differenzierung dieser Keime.)—*Ztschr. f. Hyg. u. Infektionskr.* 1937. Jan. 2. Vol. 119. No. 2. pp. 225–232. With 3 figs.

LINTON (Richard W.), MITRA (B. N.) & SEAL (S. C.). **Agglutination in the Vibrios. Part I. The Effect of Heat on Chemical Structure and Surface Potential.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 19–35.

Vibrios, like many other organisms, are regarded as made up of a heat-labile H antigen and a heat-stable O antigen. The work here undertaken was an attempt to determine the actual change brought about in vibrios by heat. "It follows from the double antigen hypothesis that the 'H' antigen, either whole or disintegrated, is to be found in the surrounding fluid after boiling, while the material remaining in the organisms themselves represents the 'O' antigen." In their summary of the results obtained the authors say : "The immediate effect of heat is to raise the surface potential and this change is correlated with the appearance of amino-nitrogen in the supernatant fluid. The long range effect of heat is to bring about a mild hydrolysis of the protein and the progressive removal of the polysaccharide from the vibrios. Both of these effects are concerned in bringing about the complex phenomenon known as destruction of the 'H' antigen."

W. F. H.

LINTON (Richard W.), MITRA (B. N.) & SEAL (S. C.). **Agglutination in the Vibrios. Part II. The Effect of Salt and Sera.**—*Indian Jl. Med. Res.* 1936. Oct. Vol. 24. No. 2. pp. 331–348. [14 refs.]

This communication represents "a first approach to the problems of vibrio agglutination on physico-chemical grounds." It is based on the present-day conception that specific agglutination of bacteria is a sensitization of the organisms by antiserum and that their equally important non-specific flocculation is an ordinary colloidal reaction dependent on "the surface potential and on the cohesive force of the sensitized organisms." Either of these reactions may be brought about separately. Much variation occurs among the individual strains as regards potential, but it has not been found possible to differentiate the vibrio chemical groups by cataphoresis. "The conception of 'fit' as a decisive factor in the degree to which reaction will occur is put forward as a suggested explanation of the cross reactions so commonly found between vibrios of different chemical structure." Some interesting points regarding the effects of sera on

surface potential and agglutination are set out. Thus: (1) "Immune serum itself has a charge-reducing effect which varies directly with the content of agglutinins" and, if the serum be of high titre, flocculation may occur even when the salt solution is of very low concentration. (2) "Cataphoresis is a more sensitive technique for determining antigen-antibody reactivity than flocculation." (3) "The reason for the increased stability of rough strains in low saline concentrations is" that "at these concentrations the potentials are much higher than in 'normal saline,' the repulsive force between the individual organisms is increased and the suspension remains stable."

W. F. H.

i. BARBER (Cella). Contribution à l'étude de la composition chimique des cendres des bactéries (vibrions cholériques). [**Chemical Composition of the Ash of Cholera Vibrios.**]—*C. R. Soc. Biol.* 1936. Vol. 123. No. 26. pp. 64–65.

ii. DAMBOVICEANU (A.) & VASILESCO (C.). Contribution à l'étude de la composition chimique (cendres) des bactéries (vibrions cholériques). [**Chemical Composition of the Ash of Cholera Vibrios.**]—*Ibid.* pp. 65–68.

i. The variation in ash of vibrios may be as considerable as from 3·92 to 13·5 per cent., and this applies to both cholera and paracholera vibrios. When the percentage was high (8–13·5) there was usually percentage increase of the potassium (0·63–0·45), of the sodium (1·25–2·64) and of the phosphorus (1·60–2) and a corresponding percentage diminution of calcium (0·04–0·06). Vibrios with low ash (3·92–4·80 per cent.) are richer in calcium salts (0·11–0·14) and poorer in salts of potassium (0·25–0·35), sodium (0·7–1) and phosphorus (0·9–1·4). It has also been found that it is the vibrios with high ash that are also most strongly agglutinated by acids and by trypaflavine and have a higher electric potential.

ii. A study was undertaken of the influence of the mineral composition of the medium on the mineral composition of the bacteria grown upon it. As a result of careful analysis the conclusion arrived at is that:—Vibrios are usually organisms whose ash is greatly influenced by the salt content of the culture medium. Modifications in the composition of the ash are specially noticeable in those organisms which are poorest in mineral constituents. *W. F. H.*

POLLITZER (R.). **Antigenic Structure of** *V. cholerae.—Reports National Quarantine Service Ser. VI.—1935–6.* pp. 57–69.

This article sets out in considerable detail the well-known work of investigators into the antigenic structure of cholera and cholera-like vibrios. It concludes with a very cautious reference to the possibility of "transmutation of cholera-like vibrios into true type under natural conditions" and to the possible necessity of revising the current ideas on the home of cholera and its endemicity. *W. F. H.*

MITRA (B. N.). **The Absorption Spectra of the Proteins of** *Vibrio cholerae* **and Related Organisms.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 5–12. With 7 graphs.

The author finds that the absorption spectra of the two types of vibrio proteins are different and that this method affords a suitable means for their differentiation. *W. F. H.*

MITRA (B. N.). **Nucleic Acid of Proteins of *Vibrio cholerae* and Related Organisms.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 1–4.

The types of protein in cholera vibrios are two and are obtained by the method of racemization. In them certain amino-acids are differently distributed in respect of their configuration positions. It was with a view to classification of vibrios that the study of their nucleic acid was undertaken. Actually the acids obtained from both types of protein were mixed together. The author's conclusion is :—" The presence of cytosine and uracil and the absence of thymine in the nucleic acid of the vibrio proteins point to the conclusion that the acid has the pyrimidine constitution of a plant and not of an animal nucleic acid." *W. F. H.*

WHITE (P. Bruce). **Differential Fixation of Cholera Phages by Extracts of *V. cholerae*.**—*Jl. Path. & Bact.* 1936. Nov. Vol. 43. No. 3. pp. 591–593. With 3 figs. on 1 plate. [15 refs.]

The range of action of certain bacteriophages has been found to be closely related to the possession of certain antigens by the sensitive bacteria. Now the A type of cholera phage attacks only true *V. cholerae* and the true El Tor vibrio. Some A phages, however, fail to attack strains of the Inaba type of cholera vibrio. The A cholera phage stands entirely alone in lysing only the S form. Expressed in other words, this is to say that, the A type cholera phage " only lyses strains possessing the type-specific polysaccharide-containing antigen of the cholera and El Tor vibrios." It was easy, then, to show that the A type phage could be differentially inactivated by the smooth, protein-free, polysaccharide, specific substance of the cholera and El Tor vibrio. " The polysaccharides derived from vibrios of other serological groups and from R and ρ races of *V. cholerae* had no inhibiting action on the A type cholera phage."

Lipoid constituents of the cholera vibrio, possessed of neither protein nor carbohydrate, were now tested for their relations to cholera phages. These were without action on phages A and D but exercised strong inhibitory action upon phages C, E, F, G, H and J.

" To sum up : it is probable that one cholera phage (A) is specifically bound by the smooth polysaccharide of *V. cholerae* . . . while certain other cholera phages (notably C, E, G and H) are fixed by and possibly make their first attack on the ' lipoid ' constituents of the vibrio."

W. F. H.

PANDIT (C. G.), MAITRA (N. M.) & DATTA ROY (B. K.). **On Inhibition of Individual Types of Cholera Bacteriophage by Vibrio Extracts.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 13–18.

It has been shown that the phage-inactivating agent of a bacterial extract is of the nature of a polysaccharide. The present study was intended to demonstrate this type of inhibition by vibrio extracts on vibrio phages and was so far successful, although " no definite correlation was obtained between phage type resistance and corresponding type inhibition." Three groups of extracts were obtained and these corresponded generally to the polysaccharide groups for vibrios.

Indeed the polysaccharide nature of vibrio strains can apparently, to some extent, be determined by the nature of the inhibition produced by their extracts. *W. F. H.*

JADIN (J.). Le bactériophage anti-cholérique. [**Anticholera Bacteriophage.**]—*C. R. Soc. Biol.* 1936. Vol. 123. No. 27. pp. 297–299.

A close examination has been made by the author of the behaviour of the vibrios cholera and El Tor to a cholera bacteriophage. Whereas this bacteriophage was active for cholera in a dilution of 10^{-8} and, after several subcultures in a dilution of 10^{-10}, it was very much less active for El Tor, which could scarcely be inhibited at 1–1,000. When the bacteriophage was maintained in culture for several months on the cholera vibrio, its activity was heightened for that vibrio, but was no more than preserved for El Tor. If on the other hand it was maintained in culture on El Tor its activity was not adversely affected for the cholera vibrio. Another point, which emerged from those experiments, was that heating of the bacteriophage for 30 minutes at 64°C. did not influence its inhibitory action on cholera but abolished its anti-El Tor action. This bacteriophage could be adapted to a temperature as high as 75°C. and, curiously enough, the action on El Tor which was initially abolished by heating reappeared. Lastly, if successive reinoculations of the bacteriophage are made in an El Tor culture in the extreme dilution of 10^{-8}, at which the phage is still capable of inhibiting the cholera vibrio, but has no effect on El Tor, it becomes active against El Tor vibrios. This shows that, when the phage has multiplied sufficiently, it is capable of inhibiting El Tor vibrios. Thus the conclusion may be drawn that the real difference shown by the two vibrios in their behaviour to cholera phage is one only of their own relative sensitiveness to its action and not of the complex composition of the phage. *W. F. H.*

SHILLONG: KING EDWARD VII MEMORIAL PASTEUR INSTITUTE & MEDICAL RESEARCH INSTITUTE, 19TH ANN. REP. FOR YEAR ENDING 31ST DEC., 1935 [ANDERSON (L. A. P.), Director]. pp. 6–13.—**Cholera (Bacteriophage) Enquiry under the Indian Research Fund Association.**

There is discernible an altogether hesitant note about the value of bacteriophage control of cholera in this report. The control areas of Nowgong and Habiganj do not seem to be furnishing unequivocal results, possibly because " during an epidemic bacteriophage is being widely used . . . along with preventive inoculation and other measures . . . . In these circumstances, it is difficult to assess the value of bacteriophage as the sole measure in the prevention and control of cholera in the experimental areas . . . . If, however, the bacteriophage control has been effective in Nowgong it is reasonable to assume it should be effective in Habiganj also. A study of the epidemic in the Surma Valley does not show conclusively that it had been so."

Some interesting results have been obtained regarding the keeping properties of bacteriophage. Peptone water is the best medium for preservation and " all types retain their potency longest when kept in cold storage." It has been found that types A, B and C are relatively resistant to heat and can be kept in the plains. Several

of the other types, however, are much more sensitive so that "under present conditions of manufacture and storage it is probable that 6–9 months is the limit up to which therapeutic phage will retain full potency unless stored in the cold." The "K" type tends to die out quickest. *W. F. H.*

BOULNOIS. L'efficacité du bactériophage dans le traitement et la prophylaxie du choléra à Chandernagor. [**Efficacy of Bacteriophage in Treatment and Prophylaxis of Cholera at Chandernagore.**]—*Rev. Méd. et. Hyg. Trop.* 1936. May–June. Vol. 28. No. 3. pp. 179–184.

Measures to test the efficacy of bacteriophage were easy to apply in Chandernagore, which is a small territory of 10 square kilometres and a dense urban population of 25,000 inhabitants. It was possible to administer bacteriophage between 1 and 12 hours of the onset of cholera. The following results are recorded :—8 deaths to begin with out of 12 untreated cases, 5 deaths out of 19 receiving only bacteriophage, 7 deaths out of 37 cases receiving both bacteriophage and hypertonic salt solution, no deaths out of 2 cases receiving only hypertonic salt solution, and 5 deaths out of 9 cases which received no treatment after the bacteriophage was available.

Prophylactic effect of administration of bacteriophage to contacts was judged by the incidence of cholera among these contacts. In the first phase of the epidemic there were 42 per cent. of cases among contacts and in the second phase, when bacteriophage was being served out, only 13·3 per cent. *W. F. H.*

SEIFFERT (Gustav). Bakteriophagen als Schutz- und Heilmittel bei Cholera. [**Bacteriophages Used Prophylactically and Therapeutically in Cholera.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Oct. Vol. 40. No. 10. pp. 460–465.

The author gives a condensed account of the work which has been going on in British India during the past few years. *W. F. H.*

MISCELLANEOUS.

AUSTRALIA, COMMONWEALTH OF: **Report of the Second International Pacific Health Conference held at Sydney, 3rd to 6th September, 1935.** 86 pp. With 1 map. Canberra: Govt. Printer.

The first International Pacific Health Conference held in Melbourne in 1926 was convened to consider public health matters of common interest to administrations in the Austral Pacific Zone. It was a first step towards securing closer international collaboration in the solution of public health problems and passed a number of detailed resolutions dealing with prompt diffusion of information regarding communicable diseases in the territories in the Zone, quarantine co-operation, and research into problems of common interest. The Austral Pacific Zone includes all territory and islands south of the equator and situated between longitudes 140°E. and 140°W.

The Second Conference passed no formal resolutions but the detailed report of its Proceedings is ample testimony to the value of such meetings and is of great interest to all in any way conversant with the special health problems of this fascinating part of the world. Dr. J. H. L. Cumpston, the Director General of the Commonwealth, once more presided over the Conference, and there were delegates from Fiji, Gilbert and Ellice Islands, Western Pacific, New Zealand Dominion and Dependencies, Western Samoa, Nauru, Papua, New Guinea, Norfolk Island, Queensland, Northern Territory, New South Wales, Federated Malay States, Netherlands East Indies, China and Japan.

In this note it is possible to do little more than enumerate the chief subjects discussed. Dr. McCallum provided a general disease picture of the Zone. Dr. de Rook confined his attention to health conditions in Netherlands New Guinea, about which very little information has been published. Malaria is the chief cause of sickness: *falciparum* infections preponderate but are of relatively mild type. Blackwater fever, however, is very common. The chief vectors are *A. punctulatus*, *A. punctulatus* var. *moluccensis* and *A. bancrofti*. Yaws is very prevalent, ankylostomiasis common and filariasis almost universal.

Leprosy was discussed at some length. Dr. Pearce supplied interesting information about the leper asylum on the Isle of Makogai, Fiji. Dr. Ryrie discussed the treatment of leprosy based on a large experience in Malaya: he made some interesting remarks about leprosy and race. The disease is relatively mild among South Indians, of average severity in Malays, and of great severity among Chinese. Information was forthcoming about leprosy in Northern and North-East Australia as well as in the Isle of Nauru.

Several delegates made interesting contributions to a discussion on diet in relation to climate, race, work, health and survival. Everywhere more emphasis is being laid on the importance of dietetic deficiency in relation to disease. Dr. Clements substantiated his claim that a diet deficient in protein, rich in cereals and partially deficient in vitamines A and B_2 plays a rôle of great importance in the causation of *ulcus tropicum* in New Guinea, the causal agents of which are spirochaetes and fusiform bacilli.

Yaws, filariasis, tuberculosis and leptospirosis were among the other diseases that came in for special consideration. With regard to the last mentioned Sir R. Cilento made some interesting observations about the fevers among workers in sugar cane in the north-eastern coastal

section of Queensland. Here, apparently, typhus and leptospirosis occur side by side, the syndrome being, Akiyami A (resembling *L. icterohaemorrhagiae*), Akiyami B (*L. hebdomadis*), endemic typhus (not mite-borne) and endemic typhus probably of the Japanese river fever type, mite-borne.

In the discussion of administrative questions relating to the work of Public Health administrations and Medical Services in the Zone the interest centred in the training of subordinate medical personnel. In this connexion the work of the Central Medical School in Suva, Fiji, and the training of Papuan Medical Assistants in the Sydney School of Tropical Medicine are noteworthy. *Norman White.*

ANIGSTEIN (Ludwik). **Third Report on the Medical Survey of Liberia (Western and Central Provinces).**—14 pp. 1936. Sept. Monrovia, Liberia: Govt. Printing Office.

The object of the survey was to examine the provinces named and to compare the conditions found with those of Sierra Leone and French Guinea. The journey was completed in two months. In the Western Province examination of 1,668 adults and children gave a yaws percentage of 24 and an estimated percentage of malaria of 60. From questions addressed to 304 women it was concluded that the "child mortality" exceeded 500 per mille. The Kissi tribe, whose economic standard was poor, had the lowest birth rate. Cases of human trypanosomiasis, leprosy and elephantiasis were seen.

In the Central Province the average spleen rate (1,309 children) was 50 per cent., and the incidence of yaws in 4,403 adults was 20 per cent. The child mortality here also was about 500 per mille (403 women). Human trypanosomiasis is probably present; eight suspicious cases were seen. An epidemic of smallpox was limited by the prompt measures taken, but it is stated that the Mano tribesmen, among whom it occurred, have a "sanitary law" by which the sick are isolated in a remote hut and the contacts are quarantined; old smallpox cases are entrusted with the nursing. It is singular that the Gbandi tribe of the Western Province have no fear of infection. In any case spread in Liberia is restricted by the fact that traffic is limited to bush paths; there are no roads or railways. In 3 per cent. of the males at the important centre of Sanoquellie there were symptoms of vesical schistosomiasis. In the hilly region of Nimba (6,000 ft.) the incidence of goitre in females was 8–10 per cent. BLACKLOCK's similar findings in Sierra Leone (see this *Bulletin*, 1925, Vol. 22, p. 652), are mentioned as well as those of the author at Macenta and Zerekore in southern French Guinea.

A leper settlement at Ganta (79 cases) is subsidized by the "International Leprosy Association"; "the living conditions of the lepers as well as the medical system applied require serious modification and improvement."

Three tables give the findings in each of 20 towns or villages; these will be useful records for future comparison. *A. G. Bagshawe.*

BULL (L. J. Forman). **The Medical Service of Tonga.**—*New Zealand Med. Jl.* 1936. Dec. Vol. 35. No. 190. pp. 396–400.

The kingdom of Tonga, "the last independent kingdom in the South Seas," consists of a group of islands 1,100 miles north of New Zealand,

and E.S.E. of Fiji, with a population of 31,000. The European medical staff comprises a Chief Medical Officer, two district M.O.s and a sister, and there are six Tongan doctors trained at the Medical School, Fiji. One of the Tongan doctors is described as almost the equal of a European M.O. and a most efficient surgeon ; he is presumably to be excluded from the statement that all the Tongan members of the staff quickly deteriorate when they are left to themselves. Sanitation seems unsatisfactory for though there are boards of health their recommendations are seldom carried out. Drinking water is collected from inadequate catchment areas in cement tanks into which dirty buckets are dipped. Latrines are bore-hole and " an excellent breeding ground for cockroaches."

The main diseases are—tuberculosis of lung, glands and skin, the chief cause of death ; typhoid of low mortality ; filariasis and myositis. Yaws is very prevalent ; the Tongans do not come for treatment till the secondary rash is well established and there is some natural immunity. Other diseases are, hookworm (not serious), conjunctivitis and trachoma, a mild form of tetanus, and some leprosy (12 cases in 3 years). Mosquitoes (species not named) are very troublesome.

The author, who is described as late C.M.O., holds out no inducement to anyone keen on his profession to take service under the Government of Tonga.

[Since Tonga lies east of the Fiji group one would expect to find, as apparently is so, no Anopheles and no malaria.] *A. G. Bagshawe.*

GALAMBOS (A.) & MITTELMANN (W.). **Albuminuria Solaris.**—*Jl. Lab. & Clin. Med.* 1936. Dec. Vol. 22. No. 3. pp. 246–248.

Albuminuria solaris is a term used by the authors to designate transient albuminuria, non-febrile, caused by [or associated with] skin reactions resulting from exposure to the rays of the sun. When there is severe reaction with chills, fever, malaise, and definite skin lesions, *i.e. dermatitis solaris*, the albuminuria is of a febrile type differing from the former in degree, for in that the fever is absent, the skin reaction mild and general symptoms hardly noticeable. The albuminuria persists so long as new areas of skin are involved, usually a few days only. It reaches its height in 24 hours or so, diminishes two to three days after the exposure and disappears in another day or two.

Four members in one family suffered in this way, the condition being discovered accidentally. A man, 50 years of age, used to report periodically twice a year for health examination. On a warm day in July he reported after a sunbath. All physical examination was negative except for a definite albuminuria. The following day his wife brought another specimen and as she herself was strikingly sunburnt, she also was asked for a specimen and this was albuminous. Two children, aged 17 and 14 years, had also sunbathed and showed similar reaction, and both had albuminuria. In each case the maximum occurred about 36 hours after exposure, then declined gradually till it disappeared 5–6 days after. The knowledge of this possibility is important for those engaged in insurance work when applicants present themselves for examination in the summer months and are apparently in excellent health, apart from albuminuria. The amount may be 1/4–1/2 per mille, more than " heavy traces." *H. H. S.*

LEIMENA (J. M.). & SARDJITO (M.). Rhinoscleroom in de Minahassa. [**Rhinoscleroma in the Minahassa District of the N.E. Celebes.**] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Aug. 11. Vol. 76. No. 32. pp. 2010–2016. With 5 figs. on 1 plate.

Three cases of rhinoscleroma are here recorded from Celebes Island: they were diagnosed clinically, by isolation and identification of cultures of the rhinoscleroma bacillus and by fixation of complement tests. Fouadin injected intramuscularly was more effective in treatment than intravenous injection of tartar emetic. The ulceration and the bad odour disappeared while the infiltration became somewhat smaller.

W. F. Harvey.

SIEGENBEEK VAN HEUKELOM (A.). **Pellagra in Batavia.**—*Nederl. Tijdschr. v. Geneesk.* 1937. Jan. 23. Vol. 81. No. 4. pp. 278–286. With 6 figs. on 2 plates. [18 refs.] English summary.

"In recent years several cases of pellagra or pellagroid affections have been described in the Dutch Indies. Ten more cases are added in the present paper, observed at Batavia within 18 months. The diagnosis was based on the typical skin affection; red tongue, diarrhoea and mental symptoms were absent only in a few cases. Anaemia repeatedly appeared to be absent. The colour index is often raised, and in a few cases macrocytosis was found. In 5 patients the gastric contents were examined, 4 of whom showed low or low-normal acid figures and one hyperchlorhydria. The figures for cholesterine, carotines and vitamines A and C in the blood were low.

"Four patients suffered from chronic colitis, mainly caused by amebiasis; in the remaining cases no cause could be traced for the pellagra. Monotonous maize diet was out of question. Whether pellagra in the Dutch Indies is on the increase, and how a possible increase has to be explained, is a question which the author thinks at present unsolvable."

RUFFIN (Julian M.) & SMITH (David T.). **A Clinical Evaluation of the Potency of Various Extracts of Liver in the Treatment of Pellagra.**—*Southern Med. Jl.* 1937. Jan. Vol. 30. No. 1. pp. 4–14. With 6 charts. [19 refs.]

An attempt to evaluate liver preparations in the treatment of pellagra. One hundred and seven patients in the Duke Hospital, Durham, South Carolina, were fed on a basic pellagra-producing diet such as was used by GOLDBERGER in his experiments on prisoners. Thirty of these cases promptly recovered before treatment had been commenced; the remaining seventy-seven failed to improve. Of these 2 received vitamin B, (a preparation of rice polishings) intramuscularly without benefit: 5 were given lactoflavin without improvement: of 5 to whom wheat germ was administered 3 slowly improved.

To 64 patients a liver preparation was given: 20 of 22 to whom an aqueous liver extract—Valentine—was administered orally, recovered: 2 of 9, who received intramuscular injections of an extract—Lilly—recovered: 1 of 3 injected intramuscularly with liver extract—Parke

Davis & Co.—recovered: only 3 of all 23 who received parenteral extract recovered.

To three a highly purified extract "266," for use in pernicious anaemia, was given; all improved but relapsed, as did some of the cases above mentioned not included among the recovered. The authors conclude that (1) a watery extract should be used, (2) it should be administered *per os.*

The watery residue of liver after extraction with alcohol given in large doses appeared to possess the curative factor. They believe that Goldberger's factor is composed of two or more factors.

H. S. Stannus.

SPIES (Tom Douglas), CHINN (Austin) & MCLESTER (James B.). **Treatment of Endemic Pellagra.**—*Southern Med. Jl.* 1937. Jan. Vol. 30. No. 1. pp. 18–21.

The authors relate the results of treatment of endemic pellagra in the southern States by the method which Spies had found useful in alcoholic pellagra in the north.

A series of 73 cases in the Hillman Hospital, Birmingham, were thus treated and it is claimed that the mortality was reduced from 32 to 7 per cent. Of the 5 deaths which did occur, in none could the fatal issue be attributed to pellagra alone. The treatment consisted, as Spies has described before, in the most careful nursing with great attention to detail in each individual case. The diet should have a 4,000 to 5,000 caloric value and contain 150 grams of animal protein. Dry brewers' yeast in 30 gram doses thrice daily was administered in egg-nog as the specific remedy in all cases in which it was not contra-indicated by vomiting or in which the diarrhoea was not made worse and uncontrolled by bismuth and paregoric. In such cases liver extract intramuscularly was substituted. The response to treatment began in 24 hours and the average length of stay in hospital was only 12·7 days. There remains however one unknown quantity and that an important one—the relapse rate. *H. S. Stannus.*

CHOPRA (R. N.), CHAUDHURI (R. N.) & DE (N.). Electro-cardiographic Changes in Epidemic Dropsy.—*Indian Med. Gaz.* 1937. Jan. Vol. 72. No. 1. pp. 1–3.

BOHEC. La fièvre estivale du Gulf-Stream. [**Summer Fever of the Gulf Stream.**]—*Ann. d'Hyg. Pub. Indust. et Sociale.* 1936. Sept. Vol. 14. No. 9. pp. 489–524. With 7 figs.

Under this name the author describes a short febrile disease occurring on transatlantic liners. The incidence and intensity are very variable from year to year, and from season to season, and coincide with certain conditions of place and climate. The disorder is commonest in the months of July and August when it may reach epidemic proportions. The symptoms in general resemble those produced in some of the short tropical fevers of uncertain origin. The onset is abrupt with a temperature ranging from about 99·5° to 101·5°F., and headache, colic, vomiting and bilious diarrhoea are usual symptoms. One very

interesting point in the aetiology is the high Summer incidence of attack on the return voyage from New York to Havre, as compared with the outward voyage from Havre to New York. Thus, to take three double voyages of the *Normandie* in 1935 :—

	Voyage.	*Cases.*
Outward	(3rd–8th July)	1
Return	(10th–15th July)	121
Outward	(24th–29th July)	8
Return	(31st July–5th Aug.) ...	91
Outward	(14th–19th Aug.)	13
Return	(21st–26th Aug.)	34

The author points out, as an explanation of this difference in incidence, that the course of the outward voyage lies to the north of the Gulf Stream, whereas on the return voyage the vessel follows the course of the Gulf Stream as far as long. 40°, in order to gain the 2 knots an hour that the current adds to the engine speed. The sudden entry into the warm waters of the Gulf Stream after half a day's steaming from New York, the two days' voyage in water which in summer may reach a temperature of about 90°F., and the sudden exit from the Gulf Stream, with regional variations in the atmospheric humidity, pressure, and electrical state, together must throw a heavy strain on the metabolic functions and mechanism for heat control of the body. To the failure of the body to adapt itself to the rapidly changing external conditions, and the resulting derangement of function, the author attributes the symptom-complex which he calls the Summer Fever of the Gulf Stream. *W. P. MacArthur.*

MACFIE (J. W. S.). **" Mossy " Foot in Northern Ethiopia.**—*Ann. Trop. Med. & Parasit.* 1936. Oct. 21. Vol. 30. No. 3. pp. 299–302. With 1 plate.

The author in January, when serving with the Ambulance Service in Ethiopia, saw at Waldia several cases of what has been described as lymphostatic verrucosis [see this *Bulletin*, 1936, Vol. 33, p. 475]. Thirty-one cases were seen in the first thousand patients coming for treatment. The condition had persisted for periods ranging between one and twenty years, the average being six, and the ages of the patients from 10 to 60 years. Both feet were usually involved, and the history obtained was that it started as a firm swelling on the dorsum, after which the skin at the bases of the toes became rough and papillomatous and the lesion spread till the dorsum and sides of the foot might be covered by a dense mass of warty growths. Sometimes fissures appeared and sepsis supervened, but not often. The oedema might extend some way up the leg and the skin become much thickened, to ½-inch at the bases of the toes. Pain was not marked, nor tenderness, the joints were not affected, sinuses did not form and the soles were in no instance attacked—distinguishing features from those of Madura foot. No history of injury was elicited [but in those accustomed to go barefoot, trauma after so long an interval would, if not severe, be forgotten]. Dr. Macfie was unfortunately working under conditions which made research impossible. *H. H. S.*

NEGRONI (Pablo). Cincuenta casos de actinomicosis y resultados de la vacunoterapia. [**Results of Treatment of Fifty Cases of Actinomycosis by means of a Vaccine.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1936. Vol. 7. No. 4. pp. 662–695. With 29 figs. [30 refs.] English summary.

Notes are given of the fifty cases ; in 25 the lesion was on the neck and face and in another 6 on the face and temporal region, indicating a dental origin in 62 per cent. of the cases ; another 7 occurred in the lower limbs, 6 in the lungs and pleura, 4 in the abdomen, one on the wrist and one on the eye. The author regards club-formation as due to actinomyces, actinobacillus, and certain strains of staphylococci and of incidental importance only. From the lesions of the head, neck, lungs and abdomen he cultivated an anaerobic actinomyces, from those of the eye and limbs an aerobic growth—*Actinomyces asteroides* and *A. madurae.* The former were referred to an autogenous infection from teeth, tonsils, respiratory or alimentary tract, the latter to exogenous lesions as injury by a thorn prick.

For treatment in 33 of the cases filtrates from cultures of the aerobic type in Sauton's medium were employed [the author calls the product a hetero-vaccine] and 20 recovered and have remained well for over five years, 6 improved considerably, 6 failed to respond ; results in the other four are not known. The number of injections given is mentioned in most cases, but not the size of the doses nor the length of intervals between doses. *H. H. S.*

CRAWFORD-JONES (C.). Dermatomycosis in the Army.—*Jl. Roy. Army Med. Corps.* 1935. Nov. Vol. 65. No. 5. pp. 306–316.

DOBSON (D. C.). **A Case of Myiasis.**—*Jl. Roy. Nav. Med. Serv.* 1937. Jan. Vol. 23. No. 1. p. 74.

The patient on a cruise on the west coast of Africa presented a swelling between the scapulae and another just above the left external malleolus. In each there was found on incision a living larva of *Cordylobia anthropophaga.* [The report does not mention whether the man had been ashore and if so how long before. As a rule the eggs are laid on the ground and the emerging larva penetrates the skin setting up an inflamed swelling in a week.] *H. H. S.*

CLEMENTS (F. W.). **Tropical Ulcer, with Special Reference to its Aetiology.**—*Med. Jl. Australia.* 1936. Nov. 7. 23rd Year. Vol. 2. No. 19. pp. 615–644. With 26 figs. (12 on 2 plates), 4 maps, 5 graphs & 1 chart. [133 refs.]

A study of tropical ulcer in a dependency of Australia and a comprehensive survey of the disease as it occurs elsewhere, with many tables. The author adds to knowledge of the dietary factor and has produced tropical ulcers in a large percentage of suitably fed and inoculated rats.

The economic importance of tropical ulcer is illustrated by a table of incidence in various countries. The Territory of New Guinea heads the list with a percentage of 35·8 (2,249 patients out of 6,277 admitted in the year) and is followed by Uganda with 13·7 per cent. (3,904 cases). [Elsewhere it is stated that few cases have been reported above 1,500 feet but most of Uganda is much above this level.] In New Guinea native labour on plantations may be reduced by 10 per cent.

Among the conditions which dispose to tropical ulcer the outstanding one is diet. Here an epidemiological survey yielded interesting results. The field work was done on the island of Manus, Territory of New Guinea, one of the Admiralty Group, some 100 by 45–60 miles, with 12,000 inhabitants. The western half is largely sago swamp. The inland people are agriculturists, the coast people fishermen. Of the agriculturists some grow taro, the rest make sago from the wild sago palm which is mixed with coconut before eating. The natives consume the food they grow or collect and whereas sago will keep for months taro must be eaten promptly. All natives obtain fish, by catching or by barter. The author compared the weight of food eaten by a number of taro and sago consumers respectively. Analysis of the diets showed that the food value of the ration of the taro eaters was, carbohydrate 718, protein 51, fat 17, total calories 3,239 and the equivalent figures for the sago eaters were 720, 39, 56, calories 3,530.

The natives calcine coral and the lime so produced mixed with betel nut and leaf or pod of the pepper tree is chewed by all. The author estimates that 4·8 gm. of lime would be taken in the day, corresponding to 3 gm. of calcium oxide. This is at least twice the amount required, so that any calcium deficiency in the diet of the Manus islanders is thus remedied.

The author estimated the vitamin B_2 content of taro by animal feeding experiments, which he describes; the conclusion is that when taro is the main article of diet it supplies an adequate amount of this complex. Animal feeding experiments with sago failed to reveal vitamins A, B_1, B_2, or C in measurable quantities. The chewing of pepper leaves provides sufficient vitamin C, but all sago eaters are inadequately supplied with vitamins B_1 and B_2; in these fish also is low.

The author goes on to give, with the aid of tables and maps, the geographical distribution of tropical ulcer on Manus in its relation to diet. These show that whereas the mean percentage incidence in villagers living on sago is 4·12, that of the taro-eating villagers is 1·14, a difference of 2·98, and these percentages are shown to be statistically significant. Thus the sago-eating villages as a class possess a high incidence rate when compared with the taro-eating villages, many of which enjoy a relative immunity. That the difference in the diets is responsible for the difference in the incidence of tropical ulcer is supported by the result of a drought, lasting 9 months. The taro crop failed and the taro eaters had to fall back on sago; the result was a 6-fold rise in incidence in the villages which had lost their taro crops, as is shown in table and chart. The same drought produced an epidemic of ulcers in New Hanover Island and here too the failure of taro had necessitated consumption of sago. The author postulates that "tropical ulcer is associated with a complete or, more probably, a partial deficiency of the vitamin B complex associated with a diet rich in carbohydrates and low in protein and fat, a combination of factors which brings about changes in the tissues, making them a suitable breeding ground for the causal micro-organisms."

A consideration of the nutrition studies of Orr and Gilks (1931) in East Africa [see this *Bulletin*, 1932, Vol. 29, p. 233] shows that their results were similar, except that these authors believed that the low calcium intake amongst the Wakikuyu was largely responsible for their tropical ulcers.

With reference to the influence of trauma, of 179 cases investigated in New Guinea 114 were of traumatic origin, and 60 began as a small swelling.

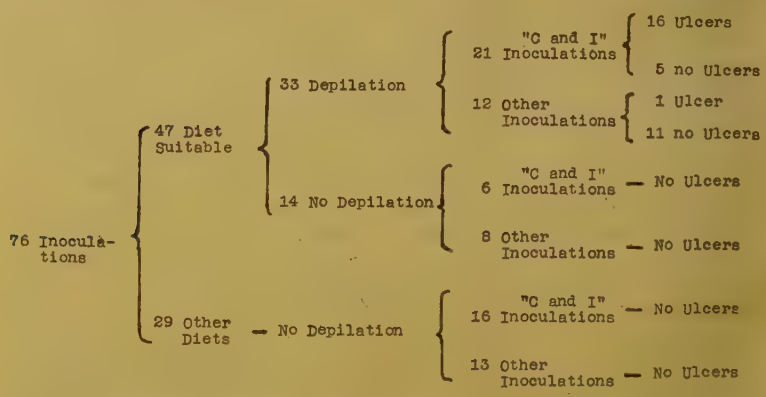
Other diseases have been regarded as contributing factors, *e.g.*, malaria ; the author reports, with figures, that there was no correlation between the incidence of ulcer and the splenic index in the children of 23 villages.

Bacteriology.—By the aid of dark ground illumination a study was made of the spirochaetes and fusiforms in tropical ulcers. Four of the spirochaete species described by David T. SMITH (1932) in the respiratory tract were found and two types of fusiform bacilli. A description is given of each. A day-to-day investigation was made of a series of 18 ulcers and the clinical stage and bacteriological findings are given in a chart. The main conclusions were that in active spreading ulcers or portions of ulcers spirochaetes and fusiform bacilli were present in large numbers, that in chronic clean ulcers there were none and that the spirochaetes were the active invaders of new tissue, the fusiforms fouling the surface.

KIRKPATRICK examined the mouths of over 2,000 Manus natives and found 25 per cent. to be suffering from suppurative periodontitis ; smears from the gums showed abundant fuso-spirochaetal organisms. The incidence among the sago-eaters was greater than that among the taro-eaters (27 and 15 per cent.). The author suggests that the skin or clothes of his associates are fouled by the frequent expectoration of the betel-chewing natives and thus an insect bite or small abrasion may become infected. He notes that the natives commonly apply saliva to staunch a wound, after which they seal it with a wide flexible leaf, thus securing anaerobiasis.

He sought to confirm this hypothesis by producing tropical ulcer in an experimental animal.

STRONG (1926) produced lesions containing fuso-spirochaetes in monkeys but otherwise such attempts seem to have failed. Clements inoculated rats with material from cases of acute suppurative gingivitis. The animals received a diet similar in composition to the average diet of the sago-eating villagers. The composition of eight diets employed



"C and I" = Cautery and instillation.

[Adapted from graph in the *Medical Journal of Australia.*]

is tabulated. Several methods of inoculation were used. A large table gives the results. In 76 attempted inoculations 17 ulcers developed and an ulcer to be accepted had to be clinically typical and to contain living fusiforms and spirochaetes. Two factors were found to be essential for the development of ulcer : (1) appearance of depilation in skin of rat, (2) vigorous trauma prior to inoculation. Depilation only occurred in rats fed for some weeks on a diet low in protein and fat and deficient in vitamin B_2 ; vitamin A took no part ; and all ulcers appeared in areas of depilation. Cautery and instillation was the most satisfactory method of inoculation, the cautery supplying the trauma. A hot needle was passed beneath the skin and the emulsion was run in along the line of the needle. The results are shown in Graph III [*supra*].

"The evidence points strongly to the assumption that as a result of a diet rich in carbohydrate and poor in protein and fat and deficient in vitamin B_2, certain changes occur in the tissues. Depilation takes place and the tissue resistance is so lowered as to enable spirochaetes and fusiform bacilli to flourish and a typical tropical ulcer to develop."

The author goes on to discuss the "reduction potential" of the skin of rats and its experimental investigation and he advances the suggestion that the anaerobic fusiform bacilli and spirochaetes are capable of developing in depilated skin because their reduction potential is greater than that of the skin.

The symptomatology of tropical ulcer as seen in New Guinea is described. The fuso-spirochaetal process is confined to the epithelium, subcutaneous tissue and fat ; if muscle fibre and bone are involved pyogenic organisms are responsible. Of 184 ulcers 72 affected anterior surface of leg in lower half, 29 and 43 the medial and lateral malleolus, 18 the tendo Achillis and 22 other situations ; the common sites are the areas supplied by the terminal vessels of adjoining arteries, which may explain the poorness of the blood supply. An estimation of serum calcium in ulcer cases did not give a figure below the normal.

The histopathology is described and attention is drawn to a resemblance between the histopathology of the skin surrounding a tropical ulcer and of the skin in the early desquamation stage of pellagra ; in each there is proliferation of the epidermis.

Finally treatment and prevention are discussed. Various methods of treatment are tabulated. In New Guinea leg baths of heated sea water are employed. When the ulcer is clear and free from discharge it is strapped with adhesive plaster. Administration of yeast extract did not hasten healing. *A. G. Bagshawe.*

ELLIS (M.). **The Relation of Blood-Calcium to Tropical Ulcer.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Nov. 28. Vol. 30. No. 3. pp. 383–388.

This article gives a clear account of a good piece of *ad hoc* research. A well-known work on medicine states that in many patients with tropical ulcer the blood-calcium is low ; vegetable foodstuffs in Nigeria have been shown on analysis to be deficient in calcium ; and, thirdly, good results had been obtained in cases of tropical ulcer by intravenous injection of calcium. The author set himself to verify these records by study of 50 cases of ulcer in different stages, the patients ranging in age between 6 and 50 years, and attending the Native Administration

Hospital at Bida, Niger Province. Taking the normal as 9–11 mgm. per 100 cc. thirty-one of the 50 had calcium within these limits, five were above and fourteen [not 13 as stated] below ; the lowest was 7·5, the highest 14·0. In one table are presented the findings—the serum calcium, the size of ulcer, the time in healing—of twenty-three who remained under observation till the final healing [in this table there are two numbered 8, and two 23 ; 7 and 14 are absent]. Kramer Tisdall's technique was employed. In 28 per cent. of these cases only was the serum-calcium below normal. The author was not able to convince himself that the rate of healing bore any relation to the content of calcium in the serum and consequently he is of opinion that treatment by intravenous injection of calcium has no rational basis. [Some 16–17 years ago H. W. C. VINES showed that in cases of chronic ulcer— he was dealing chiefly with varicose ulcers—there was malregulation of calcium, the normal ratio of free (ionic) and combined Ca being disturbed, even though the total was within normal limits. He found that administration of parathyroid extract, with or without calcium according as the total was below normal or not, yielded good results in many cases. Similar change might be found in tropical ulcer.]

H. H. S.

THURMON (Francis M.) & CHAIMSON (Harry). **Gentian Violet Treatment of Leg Ulcers. Preliminary Report.**—*New England Jl. of Med.* 1937. Jan. 7. Vol. 216. No. 1. pp. 11–14.

This article is abstracted here in order that the method, very simple and easy to apply, may be given a trial in tropical countries in which chronic and intractable ulcers are prevalent.

The authors start with the well-known fact that a common feature of practically all chronic ulcers is secondary infection, and to combat this there is need of some substance which should have bactericidal properties, control excessive granulation, and not injure the tissue cells. They find a 2 per cent. solution of gentian violet in water has these properties, and they record their results in 15 cases of chronic ulceration of various types : hypertrophic, cornified, anaemic, varicose and oedematous. Except in the last, in which application is difficult because the exudate dilutes the stain and washes it away, the results were uniformly good. Pain and irritation subsided after three or four applications and disappeared in two to three days. When a firm, dry crust formed no reinfection took place and complete healing resulted in 2 to 7 months, though some of the patients had been receiving all the usual methods of treatment for a year or more. Another advantage is that the patients can be up and about during the treatment. The technique of application is as follows :

" A 2 per cent. aqueous solution of aqueous gentian violet* was used on all cases. A topical application of the solution was applied three to five times the first day, the patient being instructed to repeat this procedure through the following 2 or 3 days, or until a hard, firm, dry, adherent crust had formed. With each application the solution was permitted to air-dry and at no time were the ulcers bandaged.

" As long as the violet-stained crust remained firm, dry and adherent it was not disturbed. Should any portion of the crust become loose or pocketed, that portion of the crust was removed with sterile forceps and scissors, the ulceration cleansed with dry sterile gauze and gentian

* Aniline violet—Gentian violet B (Merck).

violet reapplied as previously directed or until a new dry crust had formed. Loosening of the crust or pocketing beneath it is usually due to a collection of thin grey purulent material beneath the crust."

H. H. S.

BERNSTEIN (C.), Jr. & GINSBERG (J. E.). **Sensitization to Milk as a Result of its Use in Nonspecific Foreign Protein Therapy.**—*Jl. Amer. Med. Assoc.* 1937. Jan. 16. Vol. 108. No. 3. pp. 193–194.

This record provides a warning for those using milk as a method of choice for treatment by protein shock.

The patient, a woman of 24 years, suffered severely from asthma which began two years earlier though she had had attacks of hay fever. Skin tests revealed positive reactions to certain pollens and to asparagus, banana, orange and potato, negative to milk, cheese, etc. Various forms of treatment having proved ineffectual, trial at desensitization by means of a defatted milk preparation was made, beginning with 0·02 cc. intradermally, increasing gradually every 3–4 days till after 4 months she received 0·7–0·8 cc. weekly. Improvement was observed until the sixteenth week, when local reactions appeared. After 19 weeks, 27 injections, a dose of 0·4 cc. produced severe asthma and unmistakable shock, necessitating the use of epinephrine. A month later the treatment was started again with 0·02 cc., but local redness 2 cm. in diameter followed. The authors state that it would be better in such cases to use a protein not related to any food product ; typhoid vaccine or some biologically remote serum. *H. H. S.*

BRAHIC (J.) & SARDOU (M.). Un cas de diarrhée chronique durant depuis 9 ans avec présence de trichomonas dans les selles ; guérison rapide par l'essence de térébenthine (méthode d'Escomel).—*Marseille-Méd.* 1936. Mar. 15. Vol. 73. No. 8. pp. 333–338.

CLARK (Alfred). Report on the Effects of Certain Poisons contained in Food-Plants of West Africa upon the Health of the Native Races.—*Jl. Trop. Med. & Hyg.* 1936. Dec. 1 & 15. Vol. 39. Nos. 23 & 24. pp. 269–276 ; 285–295. [33 refs.]

KINGSBURY (A. N.). **The Interpretation of Wassermann and Kahn Results.**—*Bull. Inst. Med. Res. Federated Malay States.* 1936. No. 2. 4 pp. [Summary appears also in *Bulletin of Hygiene.*]

This author working in the Malay States employed the Harrison-Wyler technique for the Wassermann reaction and the Standard Kahn test. Both occasionally gave non-specific results. A positive reaction in yaws may be considered as specific. A positive reaction may be due to " coincident infection " ; in the F.M.S. 35 per cent. of 100,000 tests during the past five years have been found positive, so that unless there is definite clinical evidence of either of these diseases the serum test should not unduly influence the diagnosis ; moreover, the native will rarely submit to long continued treatment and when there are no physical signs the patient is probably not infectious, and therefore one or two injections are unlikely to be of much advantage. Causes of positivity other than syphilis are numerous, according to reports, leprosy, malaria and tropical typhus being the most important ;

in many cases, no doubt, concomitant syphilis may have been the reason. In 15 cases of benign tertian and 37 of subtertian malaria there were 8 positive Wassermann reactions and 4 positive Kahn and 11 positive Wassermann reactions and 5 positive Kahn respectively. From film examinations it appeared that the serum reaction was more likely to be positive when the malarial infection was a very heavy one but fever *per se* had no influence ; considerable variations were noted in the results of tests carried out on the same cases at relatively short intervals. In leprosy it was noted that positive reactions tended to occur in the advanced nodular type rather than in the nerve type. In typhus fever weakly positive reactions occurred during and immediately following the attack.

In general, the author found the Kahn reaction rather more sensitive and specific than the Wassermann. A frankly positive (++) Wassermann or Kahn reaction indicate syphilis or yaws except during defervescence of a severe malarial attack or in advanced cutaneous leprosy. Weakly positive (+ or ±) results should be accepted with caution and repeated on a second specimen. The Wassermann and Kahn reactions are useful but should not dominate the field of diagnosis.

[A ± Wassermann reaction should not be interpreted as " weakly positive " ; neither Harrison nor Wyler would allow this.]

T. E. Osmond.

BENHAMOU (Ed.) & GILLE (R.). Les conditions de floculation et de gélification des sérums pathologiques. [**Flocculation and Gelification of Pathological Sera.**]—*C. R. Soc. Biol.* 1935. Vol. 120. No. 32. pp. 428–429.

—— & ——. L'indice de floculabilité des sérums dans les réactions de floculation et de gélification. [**Flocculability Index of Sera in Flocculation and Gelification Tests.**]—*Ibid.* pp. 430–432.

These two papers have to do with the various flocculation and gelification reactions which have been largely used as an aid to the diagnosis of leishmaniasis. With them are included also Henry's tests or flocculations produced by melanin or albuminate of iron in malarial sera. The authors find that one can arrive at a kind of index of flocculability given by the formula $\frac{\text{euglobulin}}{\text{albumin} + \text{cholesterin}}$. In normal sera the index has a value of 0·01 to 0·05. In malaria it may reach 0·1, 0·2 or even 0·3, while in kala azar it may vary from 0·15 to 0·8 or even 1·0. The positive reactions are given when the index is high so it must be evident that though positive reactions may be suggestive of certain conditions there cannot be anything absolutely specific about them. A possible reaction thus indicates only a certain state of the serum, whatever may be the cause of this condition. *C. M. Wenyon.*

MARCZEWSKI (Stanislas). Gélification du sérum humain par les bases. [**Gelification of Human Serum by Bases.**]—*C. R. Acad. Sci.* 1936. Feb. 10. Vol. 202. No. 6. pp. 510–511.

The author states that he has confirmed the observations of KOPACZEWSKI on the gelification of sera and proteids by acids and now points out that numerous bases also have this power in the case of human sera, and that the concentration of OH-ions is not the sole determining factor. *C. M. W.*

HICKS (E. P.) & DIWAN CHAND. **A Mosquito Survey of Karachi Air Port.**—*Records of the Malaria Survey of India.* 1936. Dec. Vol. 6. No. 4. pp. 515–535. With 1 map.

This survey was made to determine the presence of *Aëdes aegypti* and Anophelines in Karachi air-port ; the prevalence of the former is of obvious importance in the face of rapid development of civil air transport. *Aëdes aegypti* does not breed naturally in the air-port ; it breeds freely in Karachi harbour, however, and it might well become established if water be allowed to stand. There is a piped water supply. Vigilance will be required when the population of the air-port increases. *A. stephensi* was the most prevalent anopheline : its control will be assured if measures, similar to those recommended in this paper, be adopted. *Norman White.*

BRITISH MUSEUM (NATURAL HISTORY). Economic Ser. No. 3. **Fleas as a Menace to Man and Domestic Animals : their Life-History, Habits and Control** by James WATERSTON, B.D., B.Sc. Third Edition. Revised by P. A. Buxton, M.A. 20 pp. With 1 plate & 6 figs. 1936. London : Trustees of the British Museum. [4*d.*]

The pamphlet was published originally in 1916, and reprinted in 1920. Certain parts of it have now been revised, but substantially it remains unaltered. It is written for those who have some knowledge of insects, and are prepared to give their serious attention to it, and it can hardly be described as a popular pamphlet. The principal topics dealt with are the external and internal anatomy : the biology of all stages, including a new short section on the effect of climate upon the numbers of fleas : certain fleas commonly found in the British Isles : the relation of fleas to plague and (very shortly) to murine typhus. A section on control brings the work to an end. Judging from the many remedies proposed, it will be concluded that we have still much to learn.

P. A. Buxton.

MACKERRAS (I. M.), FULLER (Mary E.), AUSTIN (K. M.) & LEFROY (E. H. B.). **Sheep Blowfly Investigations. The Effect of Trapping on the Incidence of Strike in Sheep.**—Reprinted from *Jl. Council for Scient. & Indust. Res.* Australia. 1936. Aug. Vol. 9. No. 3. pp. 153–162. With 2 figs.

The relation of this paper to medical entomology is that it supplies some quantitative information on a perplexing and important question. If one wishes to control some insect which has a very high potential rate of multiplication (*e.g.*, the green-bottle and the house-fly), is it or is it not worth while to kill adults ?

The authors selected several paddocks, apparently similar to one another, and ran large numbers of sheep on them, trapping the blow-flies in some paddocks, but not others. In several experiments it was observed that the sheep were less infested in the trapped than in the untrapped paddocks, and the difference was so great that it could not reasonably be attributed to chance. We may take it then that under the particular conditions existing in Australia, trapping adults did

reduce the wild population of flies, a point of considerable importance. Whether this can be done under other conditions, and if so, at what cost, remains to be found out. *P. A. B.*

OOSTHUIZEN (M. J.) & SMIT (B.). **Electrocuting Insects.**—*Farming in South Africa.* Pretoria. 1936. Mar. Reprint No. 27. 3 pp. With 3 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1936. Sept. Vol. 24. Pt. 9. pp. 214–215.]

" Electrically charged screens for killing insects, such as have been used in the United States for several years are now being sold in South Africa, and in this paper the authors describe experiments carried out to test their efficacy. The regular service supply of 220 volts was converted by means of a transformer to one of about 4,000 volts with current of approximately 18 milliampères, so that insects would be killed on contact but the device would be harmless to man or animals. The types available are a flat screen to fit over a window in places where flies are abundant or over a flat metal box in which dishes of bait such as milk or meat are placed, or a circular screen round a strong electric light to which flies are attracted. Complete screen doors fitted with electric screens are also available from the factory. Guards to prevent man or animals from coming into contact with the screens, and troughs or trays to collect the dead flies may also be obtained.

" At an abattoir at Potchefstrom a screen 18 by 24 inches was fitted in a window through which many flies passed. It was operated for 260 hours of daylight during November and December and destroyed 131,375 examples of *Musca domestica*, L., 3,375 of *Chrysomyia chloropyga*, Wied., 1,601 of *Lucilia sericata*, Mg., 719 of *C. albiceps*, Wied., 24 of *C. marginalis*, Wied., and 184 other insects that were not identified. The highest catch of house-flies between 6 a.m. and 4 p.m. was 3,430, whereas the highest catch in 24 hours was 6,983 ; it was noticed that many flies tried to gain entrance through the window just before sunset. The comparatively small number of blowflies electrocuted may have been due to the exceptionally dry weather, which decreased their abundance. It is believed that the numbers of insects counted do not accurately represent those killed, and that from 25 to 50 per cent. of those destroyed were lost, being completely burned up, blown out of the collecting trays, or eaten by birds, which visited the trays almost daily. The amount of current consumed was low, the screen being operated for about a month on 2–3 units. The screen should be especially useful in dairies, abattoirs and buildings on the sewage farms of towns and cities where flies are abundant. It may also be used in dwellings, when in addition to destroying house-flies it will prevent mosquitoes entering at night ; moreover, it offers increased ventilation and light as compared with an ordinary screen. The unnecessary sparking and short-circuiting caused by insects lodging between the two electrically charged plates placed across the screen to strengthen it could be remedied by bending the plates outward away from each other.

" Two of the lamps surrounded by electrified screens were tested at night in Pretoria on the stoep of a residence. One was fitted with a mercury-vapour tube, which gave a subdued blue light, and the other with a 75-watt frosted bulb, which gave a bright light ; both lights attracted insects, but the white light attracted more, probably because of its greater intensity. In both cases the screens were satisfactory."

HEYMONS (R.) & VITZTHUM (H. Graf). Beiträge zur Systematik der Pentastomiden. [**On the Pentastomidae.**]—*Ztschr. f. Parasitenk.* 1935. Nov. 4. Vol. 8. No. 1. pp. 1–103. With 36 figs.

The authors give a review of the systematics of the Pentastomida, a group of animals parasitic in vertebrates. Many figures of sections and anatomy are included. Unfortunately the bibliography, which would have run to about 500 references, had to be excluded for reasons of space. Those interested in human parasitology will find much valuable information about *Armillifer armillatus* and *Linguatula serrata*, the two forms which not uncommonly occur in man. The paper gives not only a full list of their intermediate and definitive hosts and of their geographical distribution, but also some account of their biology. *P. A. B.*

REVIEWS AND NOTICES.

HACKETT (L. W.) [M.D., Dr. Ph., Assistant Director, International Health Division, the Rockefeller Foundation]. **Malaria in Europe. An Ecological Study.** University of London Heath Clark Lectures, 1934 delivered at the London School of Hygiene & Tropical Medicine.—pp. xvi+336. With 60 figs. 1937. London: Humphrey Milford, Oxford Univ. Press. [10*s*. 6*d*.]

Material collected for the Heath Clark Lectures given in London in December 1934, brought up to date, is the foundation of this book. It is an admirable production. It contains a lucid, well-balanced discussion of the malaria problems of Europe, with special reference to the acquisition of knowledge, concerning the part played by the different races of *Anopheles maculipennis* in the spread of the disease, that has made the last decade noteworthy in the history of malaria research. To those who have had the good fortune of seeing something of the work that has been done by the author and by his colleagues in the investigation and control of malaria in countries of South Europe during the last ten years the book will make a special appeal. As an authoritative statement of the present state of our knowledge concerning the problems that still await solution and of the manner in which existing knowledge can be utilized to best advantage in the fight against malaria in Europe the book cannot fail to interest all concerned with this important branch of health endeavour.

There has been in the past a marked cleavage of opinion among malariologists regarding the vexed question of the control of malaria in Europe. There are many who have looked upon malaria in Europe as a social disease, its prevalence being in large part attributable to social and economic factors, the removal of which would be followed by the rapid disappearance of the disease. Others regard the prevalence of the disease as a local question, a parasitism adapting itself to all sorts of conditions, able to turn social factors to its use, but not dependent upon them, and eradicable only through the effective control of the insect vector. The latter is the doctrine to which the author subscribes wholeheartedly and numerous and convincing are the arguments which he marshals to justify his faith. Successful achievements, in varied conditions by a diversity of measures, are even more convincing than the arguments, and of such there is a rich record. In divided counsels the author sees a barrier to progress in the effective control of the disease and this, one feels, was perhaps the chief incentive to write this book. The caption to Chapter I is apposite, "If the trumpet give an uncertain sound, who shall prepare himself to the battle?" In the same line of thought is the following quotation from the last page of an interesting book. "The important fact is not that there are unsolved, and at present insoluble, problems of malaria in the world. It is that there are thousands of communities oppressed for ages by the disease that could be liberated with a little thought, energy and money which would not be difficult nowadays to assemble and apply. The mechanism of malaria transmission is so complicated and delicate that it never has been able to resist any long-continued sabotage. Persistence is more important than perfection, and whether control is a partial failure or a partial success depends on the point of view." *Norman White.*

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